~~MANUAL FOR DELINEATING WETLANDS~~

1044b UIC - EAST POPLAR OIL FIELD
ENFORCEMENT CASE SDWA 1431
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89 **BIERE 1 22 WELL REMEDIATION & MONITORING PLANS RECEIVED AFTER NOVEMBER 30 2000**

East Poplar Oil Field

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May 7, 2001

VIA FACSIMILE

Mr. Connally E. Mears, Director
Technical Enforcement Program (8ENF-T)
Office of Enforcement, Compliance, and Environmental Justice
U.S. Environmental Protection Agency
999 18th Street, Suite 300
Denver, CO 80202-2466

Re: Biere Well Site, East Poplar Oil Field: Comments on Draft Administrative Order on Consent

Dear Mr. Mears:

Thank you for the opportunity to comment on the Proposed Emergency Administrative Order on Consent (AOC), received by our office on April 23, 2001. In general, we believe the proposed AOC sets forth a workable structure for conducting response action activities at the Biere well site and is drafted in a way that is fair to both parties. We do have a few substantive concerns and some suggested clarifications aimed at ensuring that the document accurately reflects conditions at and near the site.

General Comments

A. As we previously have discussed, Pioneer would like to attach the Response Action Plan and Monitoring Plan to the AOC to define the work that will be done under the Order. Pioneer and EPA have been working hard on both documents, and we should finalize them shortly. Thus, there is no reason not to reference these plans and thereby minimize any subsequent technical disputes, particularly since Pioneer has no real dispute resolution options open to it.

B. A theme common to many of our comments is that the Order should distinguish between environmental concerns related to the East Poplar Oil Field as a whole, including the scores of injection wells in the Field operated by other companies, versus the localized concerns in the area of the Biere well. The Findings section taken largely from the first administrative order simply does not apply to this AOC, which addresses only one company and one well. Thus we have provided some editorial suggestions designed to avoid implicating Pioneer in regional contamination issues for which Pioneer bears no responsibility.

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Paragraph 11: Available data suggest that there may be a plume in the immediate area of the Biere well and a separate plume moving down the valley from sources to the north of the Biere site. The AOC should distinguish between these plumes, or at least reflect the fact that certain of the hits are not suspected to have been caused by releases from the Biere well.

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Sincerely,

Steve Leifer

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c: Nathan Wiser/Jim Eppers/Steve Moores, EPA
Marc Skeen, Pioneer Natural Resources USA, Inc.
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Steve Mamerow, Pioneer Natural Resources USA, Inc.
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December 21, 2000

VIA OVERNIGHT MAIL

Mr. Nathan Wiser
U.S. Environmental Protection Agency
Office of Enforcement, Compliance, and Environmental Justice
Technical Enforcement Program (8ENF-T)
999 18th Street, Suite 500
Denver, CO 80202-2466

Re: Biere Well Site, East Poplar Oil Field

Dear Mr. Wiser:

Pioneer Natural Resources recently conducted investigatory activities near the "Biere," well site located at the south flank of the East Poplar Oil Field. Following the investigation, I provided your office with a Field Investigation Report summarizing the results of the groundwater sampling and other measures implemented at the site.

Pioneer and its technical consultants have now developed a proposed plan for preventing any future migration of contaminants from the Biere well site. Pioneer would like to implement the response measures outlined in the plan as soon as possible. We ask that the Region review the plan and let us know if you have any questions, comments or concerns.

A copy of the plan also is being provided to the Ft. Peck Tribal Environmental Manager. We look forward to your response.

Sincerely,

Steven L. Leifer

Steven L. Leifer

Enclosure

c: Jennifer G. Fry, Pioneer Natural Resources USA, Inc.
John W. Ross, The Brown Law Firm

Proposed
Biere #1-22 Well
Response Action Plan

Pioneer Natural Resources USA, Inc.

December 2000

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I. *INTRODUCTION*

The purpose of this report is to present Pioneer Natural Resources USA, Inc.'s Proposed Response Action Plan (hereafter "Plan")for the Biere #1-22 well site. The Plan provides for a seal around the wellbore of the Biere #1-22 production well to prevent future upward migration of fluids to the shallow aquifer.

This report first presents a background summary of the East Poplar Oilfield and the Biere #1-22 well. Second, it presents a summary of Pioneer's investigation and analysis near the Biere #1-22 well. Third, it describes alternative actions and remedies considered by Pioneer Natural Resources. Finally, it describes in some detail, the proposed Plan and preferred actions and remedies to be taken by Pioneer Natural Resources. This Plan is designed to fulfill the requirements of an Engineering Analysis/Cost Analysis and other aspects of the National Contingency Plan (NCP). The source control work described herein represents a "removal" action, which will be consistent with whatever long term site management strategy ultimately is implemented.

II. BACKGROUND

Oil production in the East Poplar Oilfield began in 1952. Along with crude oil, brine was produced. Murphy Oil, USA, Inc. currently operates most of the wells in and near the East Poplar Oilfield, although at least seventeen other oil companies, including MESA Petroleum, have been involved in past production activities. (See U.S.G.S. 1997 Report). For many years brine was re-injected, in accordance with governmental regulations, into salt water disposal wells to sub-surface formations, including the Judith River and Dakota formations (See U.S.G.S. Table 1). In 1996, four brine-injection wells were active, although at least sixteen others were active at times during the Oilfield's history (See U.S.G.S. Table 2).

In 1970, MESA Petroleum Co. ("MESA") drilled the Biere production well, and an associated salt water disposal well, in Section 22, Township 28 North, Range 51 East, in the East Poplar Oilfield in Roosevelt County, Montana. The Biere production well and salt water disposal well were operated by MESA from 1970 to 1972, and operated by Amarco Resources from 1972 to 1976, and operated by MESA from 1976 to 1984. In 1984 the Biere production well and salt water disposal well were plugged. In 1985, after discovering migrating water from the sub-surface, MESA drilled a relief well near the Biere production well and further plugged the Biere #1-22 well. Following that 1985 re-plugging, migration of fluids to the surface apparently stopped for some time. However, later migration of fluids apparently occurred near the Biere wellbore, which may have occurred as a result of over pressurization of the Judith River formation from salt water disposal.

In 1997, Pioneer acquired the assets and liabilities of MESA. Consequently, Pioneer Natural Resources' prior knowledge regarding the Biere #1-22 well is limited.

In 1998 and 1999, Pioneer learned of allegations of salt water contamination in the East Poplar Oilfield shallow groundwater aquifer. Certain Plaintiffs filed a complaint against Pioneer and others, alleging that their shallow water wells had been contaminated by salt water from oilfield operations. In 1999, E. P. A. issued an Order requiring Pioneer and others to conduct investigations regarding their operations and alleged contamination in the East Poplar Oilfield.

III. PIONEER'S INVESTIGATION AND ANALYSIS

In response to the lawsuit and E. P. A. Order, Pioneer initially reviewed available records concerning the Biere well and the East Poplar Oilfield, including MESA's old records that could be located, and B.L.M., U.S.G.S. and E. P. A. documents.

In July 1999, Pioneer commenced a field investigation by doing an onsite inspection at the Biere well site. However, no visible contamination was observed at that time at the Biere site surface. In November 1999 Pioneer did further onsite inspection and took soil samples at the Biere well site. That November 1999 site inspection and soil samples again indicated minimal contamination at the surface of the Biere well site.
In February 2000, Pioneer drilled shallow, exploratory test holes near the Biere well and salt water disposal well. This February 2000 drilling of preliminary test holes at the Biere well site revealed evidence of some old metal oilfield debris, and elevated water temperatures, at a depth of approximately 41 feet below the surface. Based upon these test borings, follow-up monitoring appeared to be warranted.

In May 2000, Pioneer installed eight shallow monitoring wells near the Biere 1-22 well site (see locations of these eight monitoring wells shown on Figure 1). In late May and early June 2000, these new monitoring wells were surveyed and sampled. Samples from these wells were then sent to Energy Labs in Billings, Montana for analysis. Results from these monitoring wells, and sampling thereof, generally confirmed a south-southwest groundwater flow and indicated areas with elevated conductivity, chloride and total dissolved solids. The results from the monitoring well PNR 4, at the site of the Biere #1-22 production well, showed elevated temperatures and elevated total dissolved solids, and some levels of BTEX hydrocarbons. Monitoring well PNR 7, located to the west of the Biere #1-22 well, also showed signs of BTEX hydrocarbon components. No domestic wells currently being used, show any signs of BTEX or hydrocarbon components. At this time, Pioneer's investigation suggests that the plume from the Biere #1-22 production well is fairly limited and localized near the Biere Well. (See Pioneer Natural Resources' August 2000 Report for further details regarding its May 2000 Field Investigation).

IV. ALTERNATIVE COURSES OF ACTIONS AND REMEDIES CONSIDERED BY PIONEER NATURAL RESOURCES

To stop further migration of fluids near the Biere wellbore, Pioneer considered several alternatives.

1. One alternative considered was to re-enter the old Biere producing wellbore in an attempt to re-plug the wellbore and surrounding area. This alternative was rejected for several reasons. The existing wellbore contains cement and old tubing. It would be extremely difficult, or impossible, to re-

enter the existing wellbore without risking perforation of the existing wellbore, which could lead to further problems. Therefore, this alternative was viewed as mechanically difficult or impossible.

2. A second alternative considered was to drill another "twin"well along side the Biere #1-22 well, all the way to the Charles formation. This alternative was discarded because it may open up greater problems by allowing communication with deeper formations to the shallow aquifer. Furthermore, in order to prevent fluids from entering into the shallow fresh water aquifer, it is only necessary to seal off the area above the Judith River formation.

3. A third alternative considered was drilling a relief well into the Judith River formation and then re-injecting any fluids from that well into a deeper formation. However, such alternative was rejected because it may simply continue the cycle with re-injected fluids somehow reaching the shallow aquifer. This option would also involve ongoing operational costs and inconvenience to the existing surface owner.

4. A fourth alternative considered was to drill one or more relief wells near the old Biere wellbore, into the Judith Formation. Sealing fluids would be injected through these relief wells, which would spread out and form a seal around the old Biere production wellbore.

V. *The Preferred Remedy and Plan to Stop Migration of Fluids*

The fourth alternative, using relief wells and injected sealants, is the preferred remedy and plan. This Plan imposes less risk and inconvenience to the environment and surrounding land owners. This Plan, as now proposed, should be successful long term, for several reasons. First, there is probably less pressure on a seal across the Judith River formation because no one is currently injecting fluids into the Judith River formation. Secondly, this Plan would provide an larger seal from the one created in 1985, because the sealant would be injected through four wells, not one, and would therefore create a larger seal. Third, better sealants would be used than the sealants used in 1985. Therefore, this approach is likely to have long term effectiveness, particularly if the most efficient well pattern is selected and the right well design is used, and the best sealant fluids are used. Pioneer and its consultants spent considerable time studying drilling pattern options, well design options and sealing fluid options, which are discussed below in more detail.

Because none of the first three alternatives are technically practicable, it was not necessary to compare the cost of these alternatives.

A. Drilling Pattern Options

Five options were analyzed to select the most efficient drilling pattern. These options consider two types of wells: injectors and producers. Injectors will be used to inject the sealing fluids, and the producers will be used to monitor the fluid being injected., and its effectiveness. Each of the five options are presented in the figures on the following pages which are labeled as Options 1-5.

1. 4 Wells (All four wells used as injectors)
2. 4 Wells (Three wells used as injectors, and one initially used to monitor)
3. 4 Wells (Two wells used as injectors and two as producers)
4. 3 Wells (Three wells used as injectors)
5. 3 Wells (Two wells used as injectors and one as producer)

B. *The Preferred Drilling Pattern Option*

After analysis of the five drilling pattern options, Option #2, using 4 wells, is considered the most effective. Option #2 involves 4 wells (3 injectors and 1 producer) for initial monitoring. The injector wells will be drilled 10 feet away from the Biere 1-22 well and will inject sealant into 32 feet of the Judith River Formation. The injection pattern of each well in a four spot pattern (see Figure 1), shows that approximately 25% of the volume of fluid being injected will go inside the area of interest and that 75% will help form a protective "belt" around the Biere 1-22 well, effectively preventing the upward migration of the fluids. The "old" relief well will be used initially to monitor the progress of the injected sealant. The "old" relief well was drilled 25 feet away from the Biere 1-22. At the end of the job, sealant will also be injected into the original relief well to insure proper isolation around this older wellbore.

C. *Well Design Options*

Two well designs were considered for the drilling of the injection wells. The design of these wells was optimized to contribute to the integrity of the cement jobs for each of the new wells to be drilled. Such integrity will contribute to the success of the injection procedures, and will help to avoid further contamination of the aquifer.

Well Design, Option A (See Figure 2) considers setting a protective 13-3/8" string inside a 17-1/2" hole down to 45'. Then a 7-7/8" hole is drilled down to 688' and 5-1/2" casing is run. The hole will be completed with a 4-1/2" bit down to 720', leaving these last 32' exposed for injection. This option, to some extent, follows what was done in the "relief" well drilled by MESA Petroleum in 1985.

Well Design, Option B (See Figure 3), on the other hand, considers changes to Option A in order to account for expected water flows and to take advantage of the latest under-balanced well control and cementing methods in order to obtain improved results in the cement jobs, thereby adding additional protection of the aquifer. As revealed by the drilling reports of the "relief" well that were analyzed, the formation changes at around 40' to 44', going from clay to sand, and an influx of water into the wellbore was observed at this point. It has been determined that the surface hole should be drilled down to approximately 65' (top of Bearpaw Shale) and 13-3/8" surface casing will be run and cemented.

The main deviation from the original design involves drilling an intermediate section. Since the main priority of this project is to stop the possible upward flow of fluids into the aquifer found from 45' to 140', it was decided to drill a 12-1/4" hole down to 240', run 9-5/8" casing, and cement the string in place. This intermediate casing string provides an additional barrier to migration and increases the probability of obtaining a quality cement job that will not be compromised by water influx. Proof will be obtained that a seal has been established through a shoe test on the 9-5/8" casing.

A 7-7/8" hole will be drilled down to 688', and a 5-1/2" casing string will be run and cemented. A 4-1/2" hole will be drilled down to 720', leaving these last 32' of hole exposed as an open path to inject the special fluid for the remediation of Biere 1-22 well.

D. *The Preferred Well Design Option*

Option B was selected as the best well design. It allows the injection of remedial fluid, while at the same time protecting the integrity of the aquifer.

E. *Injection Fluids Analysis*

In selecting the fluids to be used in this project, Pioneer worked with Signa Engineering and Halliburton Energy Services, both of whom have expertise in plugging wells. A report from Halliburton discussing solutions to shutting off wells is included in Appendix "1", attached hereto.

Sealant will be injected through four wells into 32 feet of the Judith River Formation, at approximately 688 feet to 720 feet below the surface. The volume of fluid required may be approximated by assuming radial injection behavior as shown in Figure 4. The overlap between the injection patterns will provide excess volume, which should insure a good squeeze. The Judith Formation is sandstone with 20% porosity and a permeability of +/- 1 Darcy. The volume of void space (assuming 20% porosity) that the remedial fluid will have to fill is:

Injecting Volume $_{pore}$ **(1 well)** = 516 bbls (or 21,667 gallons)
Injecting Volume $_{pore}$ **(4 wells)** = 2,064 bbls (or 86,668 gallons)

This volume assumes the injecting fluid will travel from the remedial well to the Biere #1-22, at a distance of 12' (10' radius + 2' extra to surround the wellbore).

The main function of the injection fluid is to plug the matrix and all existing fractures around the Biere 1-22 well, while avoiding the creation of any new fractures.

The ideal sealing fluid must have the following characteristics:

1. No filter cake.
2. Deep penetration.
3. Similar flowing properties as water (low viscosity).
4. Resistance to temperature (in this case, 200°F Max).
5. Strong and permanent.
6. Environmentally friendly.
7. Must resist relatively high pressure differentials.
8. Readily available.
9. Cost effective.

The fluid considered should not form any filter cake while being pumped. The formation of such a cake would result in early plugging of the pores being injected, preventing us from pumping the full amount of fluid necessary to reach the target (Biere 1-22 well). Of the fluids considered as candidates, **Halliburton's INJECTROL U** complies with all of the stipulated requirements. What follows is a description of the INJECTROL, according to data and conversations with Halliburton.

F. <u>INJECTROL is the Preferred Sealant</u>

Halliburton has recommended their INJECTROL product as the best choice for this situation. Moreover, Halliburton has provided a recommended injection procedure for placement of the material. INJECTROL sealant is an inorganic material (sodium silicate) which has proven very successful in forming a permanent barrier to water in both producing and injection wells. Based on the information provided by Halliburton, INJECTROL is placed as a water-thin fluid, which changes to a very firm gel at a controlled time. The initial low viscosity of the treating fluid combined with the firmness of the gel allows for the depth of penetration and strength required for effective matrix sealing.

Zonal isolation may be necessary when treating either a producing or injection well. Placement techniques include packers, treating perforations, dual injection and open hole injection methods. Matrix rates (below the fracture gradient) should be maintained to fill the porosity with the material. INJECTROL service is applicable between 60 degrees F and 260 degrees F.

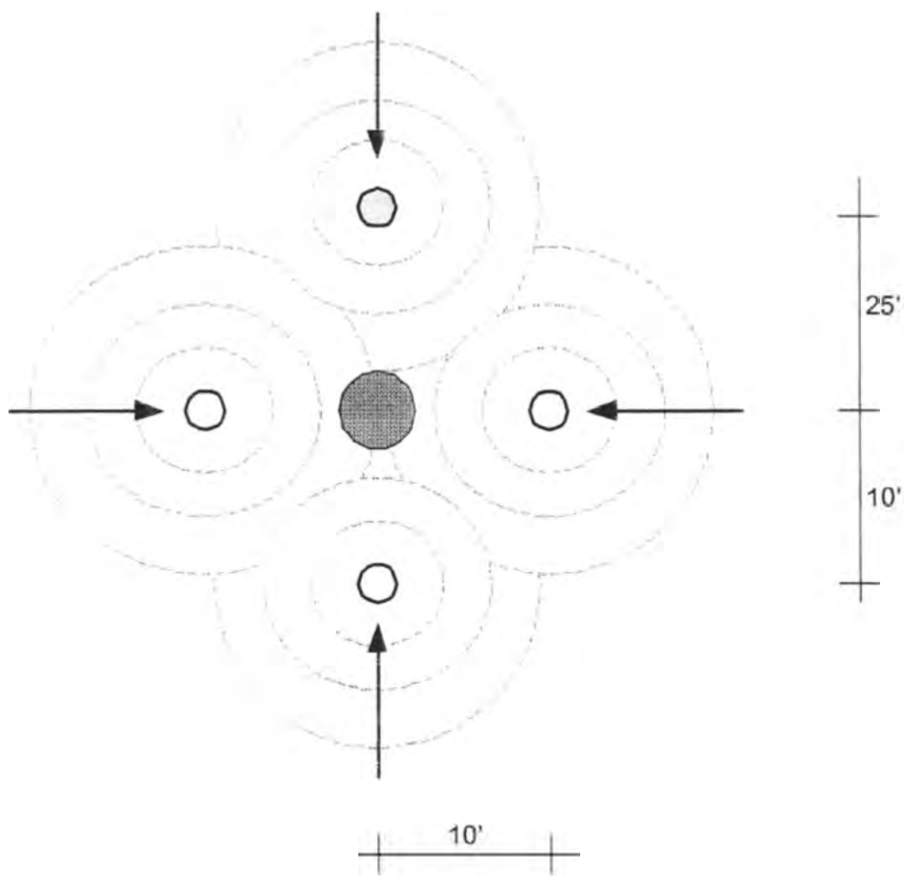
In summary, INJECTROL has several advantages in this situation. It allows large volume treatments, which give deep formation penetration. The shut-in time on the treated well is short (overnight), and its low viscosity allows for ease of penetration.

G. *Further Monitoring*

The old relief well, which is 25 feet away form the wellbore, will be used to monitor the initial progress and effectiveness of the seal. Other existing monitoring wells can also be used to monitor the effectiveness of the seal. In cooperation with the E. P. A. and others, existing or additional monitoring wells can be used to further access ground water flows and determine the extent, direction, and attenuation of any plumes.

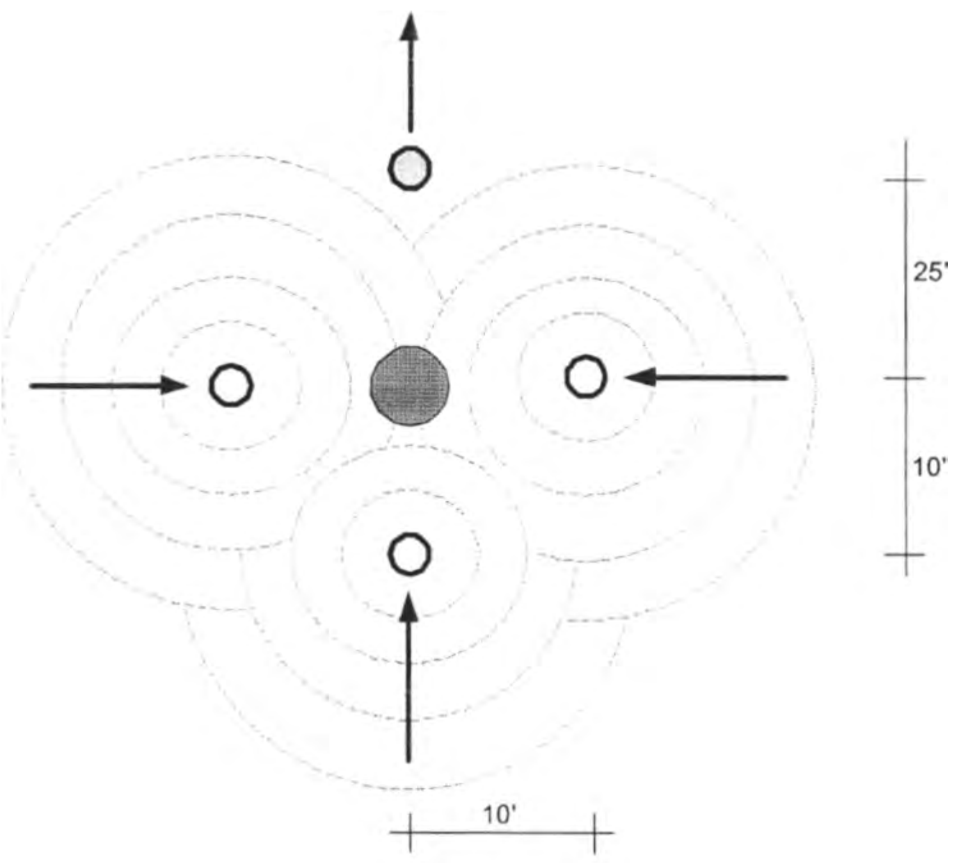
Biere Remediation Project
Roosevelt County, Montana
Pioneer Natural Resources USA Inc.

Option #1



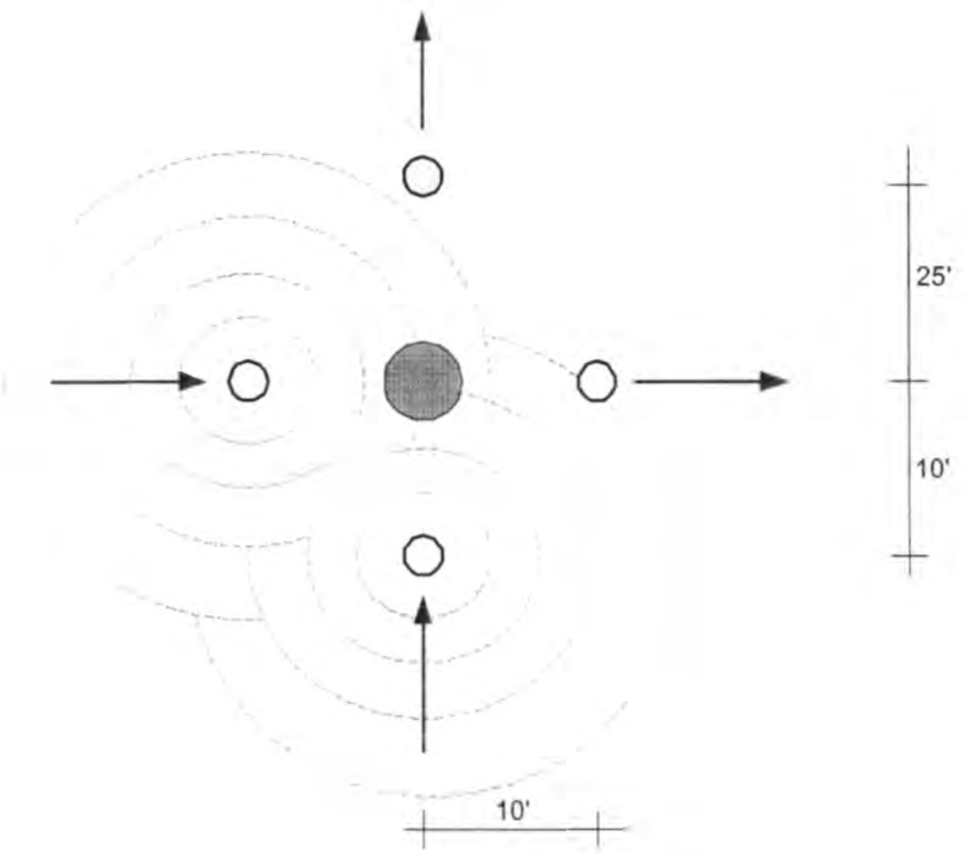
Biere Remediation Project
Roosevelt County, Montana
Pioneer Natural Resources USA
Inc.

Option #2



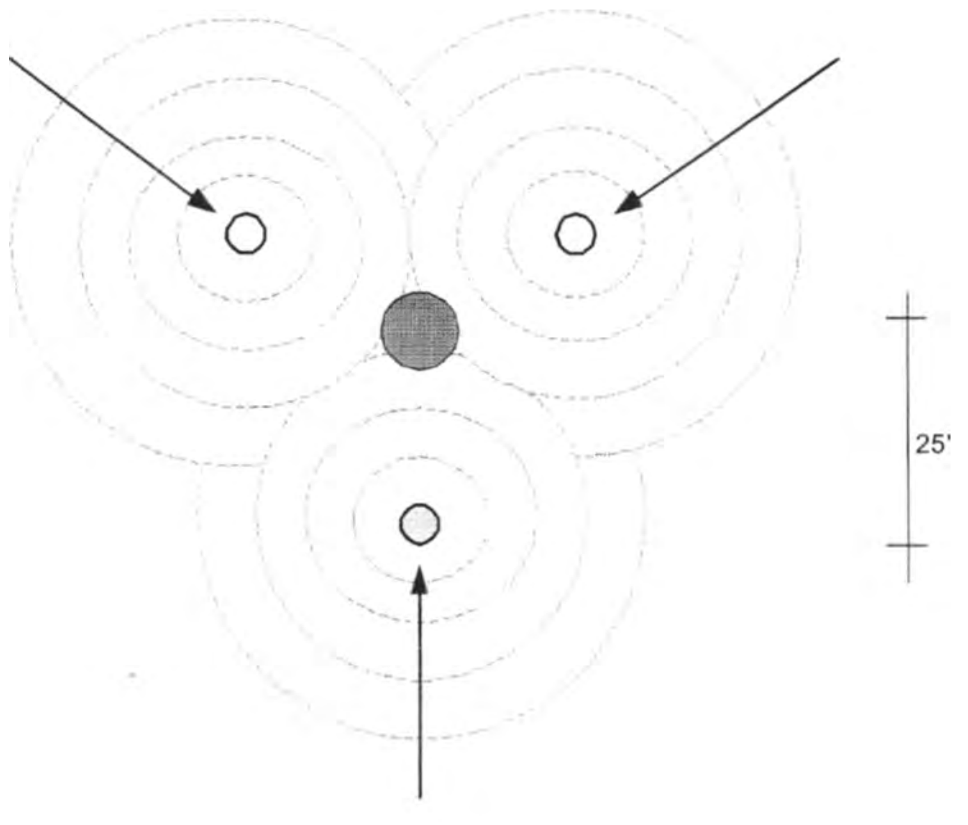
Biere Remediation Project
Roosevelt County, Montana
Pioneer Natural Resources USA
Inc.

Option #3



Biere Remediation Project
Roosevelt County, Montana
Pioneer Natural Resources USA
Inc.

Option #4



Biere Remediation Project
Roosevelt County, Montana
Pioneer Natural Resources USA
Inc.

Option #5

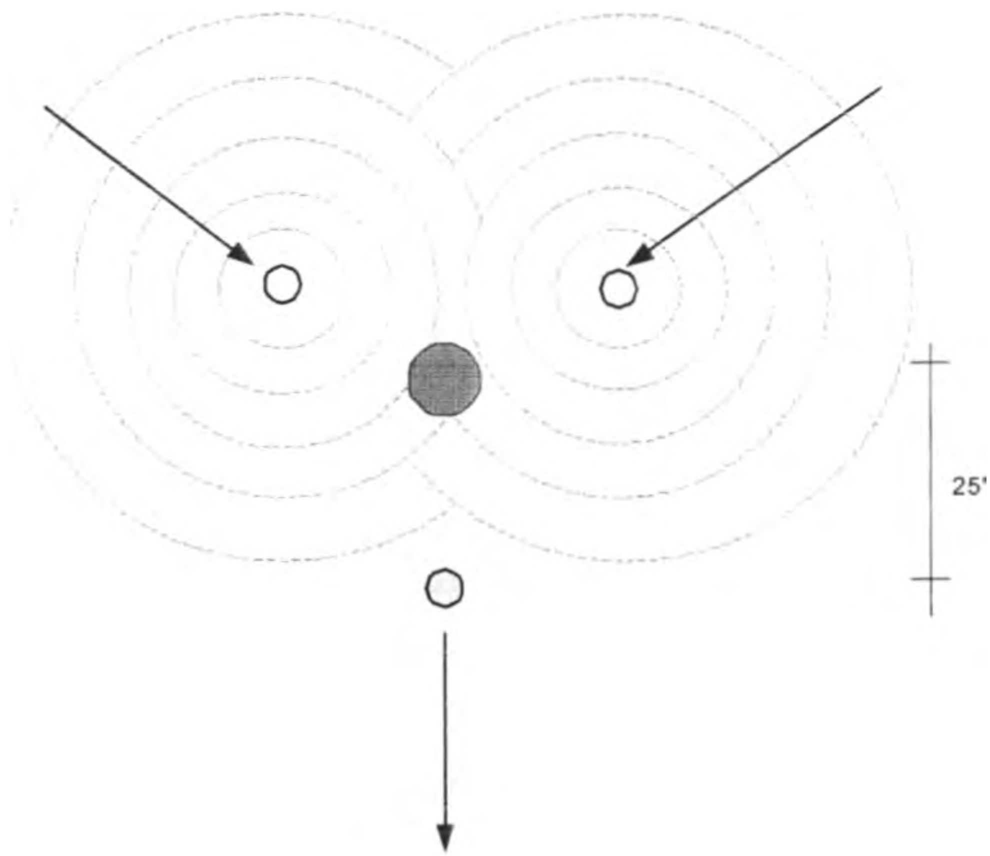
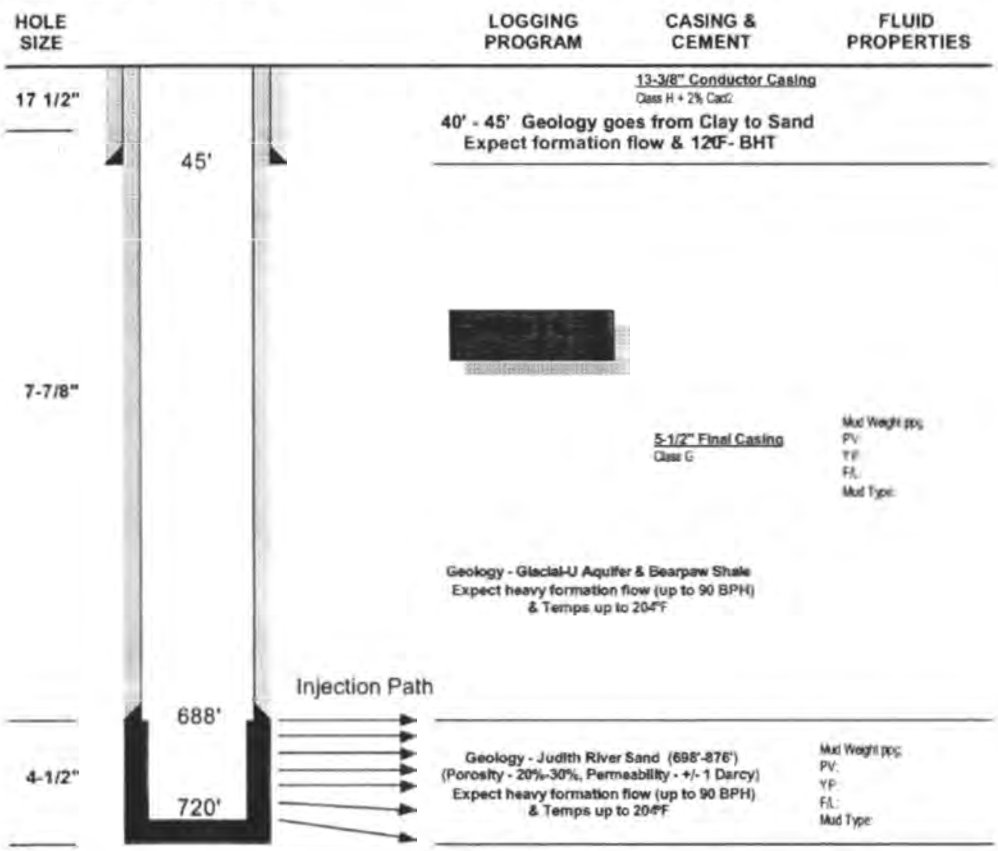


Figure 2 - Well Design, Option A

DRILLING PROGNOSIS
"Pioneer Natural Resources USA Inc."

WELL :	**Biere Remedial Well (Option A)**		
FIELD :	**Poplar**		
CATEGORY :	**Remedial / Vertical**		
COUNTY :	**Roosevelt**	**STATE:**	**Montana**
LOCATION :	**22 - T28N - R51E**		
OBJECTIVE :	**Top of Judith River**		
ELEVATION :	**2,074 GL**		



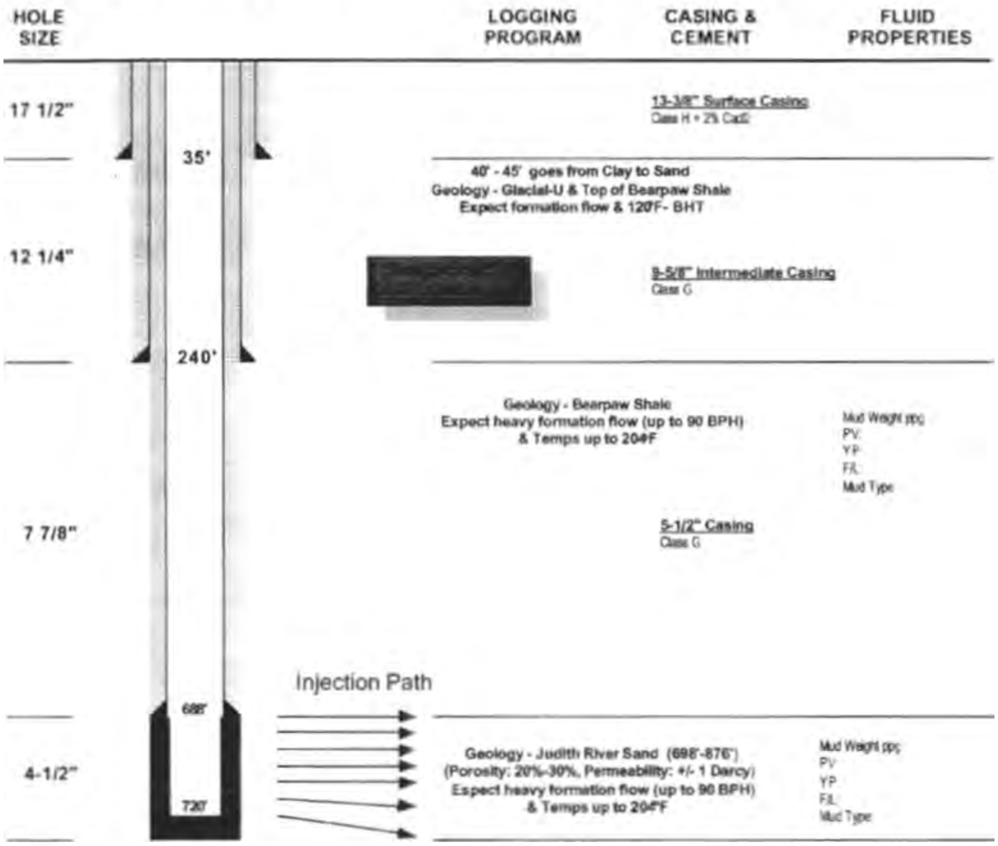
PREPARED BY: ______________________ **DATE:** ______________________

APPROVED BY: ______________________ **DATE:** ______________________

Figure 3 - Well Design, Option B

DRILLING PROGNOSIS
"Pioneer Natural Resources USA Inc."

WELL :	Biere Remedial Well (Option B)		
FIELD :	Poplar		
CATEGORY :	Remedial / Vertical		
COUNTY :	Roosevelt	STATE:	Montana
LOCATION :	22 - T28N - R51E		
OBJECTIVE :	Top of Judith River		
ELEVATION :	2,074 GL		



PREPARED BY: ______________________ DATE: ______________________

APPROVED BY: ______________________ DATE: ______________________

BAKER BOTTS LLP

THE WARNER
1299 PENNSYLVANIA AVE., NW
WASHINGTON, DC
20004-2400
202.639.7700
FAX 202.639.7890

AUSTIN
BAKU
DALLAS
HOUSTON
LONDON
MOSCOW
NEW YORK
WASHINGTON

STEVEN L. LEIFER
202-639-7723
E-Mail: sleifer@bakerbotts.com
Facsimile: 202-585-1040

December 29, 2000

VIA OVERNIGHT MAIL

Mr. Nathan Wiser
U.S. Environmental Protection Agency
Office of Enforcement, Compliance, and Environmental Justice
Technical Enforcement Program (8ENF-T)
999 18th Street, Suite 500
Denver, CO 80202-2466

Re: Biere Well Site, East Poplar Oil Field

Dear Mr. Wiser:

On December 21, I provided you with a copy of a Proposed Response Action Plan for the above-referenced site. Certain figures and attachments to the Plan were inadvertently omitted from the package sent to you. Enclosed are the relevant materials. Please append them to the Plan.

Sincerely,

Steven L. Leifer

Steven L. Leifer
Counsel to Pioneer Natural Resources USA

Enclosures

DC01:273106.1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
http://www.epa.gov/region08

Ref: 8ENF-T

JAN - 3 2001

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Steven Leifer
Baker Botts L.L.P.
The Warner
1299 Pennsylvania Avenue, NW
Washington, D.C. 20004-2400

Re: Comments on December 21, 2000 Proposal
Biere 1-22 Production Well
East Poplar Oil Field
Roosevelt County, Montana

Dear Mr. Leifer:

My staff have reviewed the December 21, 2000 "Proposed Biere 1-22 Well Response Action Plan" (the "Plan") for addressing the on-going contamination at the Biere 1-22 production well site. Also included in the review were figures and attachments received on January 2, 2001, which had been omitted from the December 21, 2000 letter. EPA is pleased that you are taking steps to address the on-going contamination apparent at the Biere 1-22 former production well. We offer these comments on the materials reviewed.

1. Although the Plan at Section VI(1) mentions that re-entry into the Biere 1-22 wellbore would be difficult to accomplish, EPA maintains that this may nonetheless be crucial to permanently preclude further vertical fluid migration from depth into the shallow Quaternary deposits forming the underground source of drinking water (USDW) in the area. Temperatures measured in the near vicinity of the Biere 1-22 well as high as 140 °F are consistent with at least a partial source depth below the Judith River sandstone located between 698 and 876 feet depth. Accordingly, it is quite conceivable that the leak(s) into the USDW travels via a pathway that includes the inner portions of the Biere 1-22 wellbore. The most permanent method to stop this leaking may be re-entry into the Biere 1-22 wellbore itself. Please re-consider obstacles to such re-entry. If it seems truly impossible to achieve, please explain in more detail why this option cannot be pursued. For instance, can you use an under-reamer to mill a window through the 2-7/8 inch tubing to the 7-7/8 inch hole diameter within the Judith River sandstone? This might allow the opportunity to seal the inside of the wellbore at the depth of the Judith River.

2. The figures that accompanied the Plan showed Pioneer's preferred well spacing (so-called Option 2). This spacing should be modified to spot the three injection wells around the Biere 1-22 well in an equilateral triangular pattern, where each injection well would be located 120° of arc from the each other. This pattern would provide a greater level of assurance that the injected chemical shut-off fluid would adequately surround the Biere 1-22 wellbore and form a tighter barrier within the top 32 feet of the Judith River sandstone.

3. EPA recommends that both re-entry into the Biere 1-22 wellbore and the use of a chemical shut-off fluid at the top of the Judith River be used to ensure that the as-yet unknown specific pathway of the contamination is sealed. As stated above, the fact that such elevated temperatures are observed in the shallow aquifer argues for at least a partial source depth significantly deeper that the Judith River. However, the Judith River is well documented to have significantly elevated pore pressure due to its use as an injection zone. Hence, the Judith River may also contribute some share of fluid to the contamination.

4. The Plan inadequately describes the monitoring program at the offset "old" relief well located 25 feet away from the Biere 1-22 well. Please describe the monitoring at this well, and others if necessary. The monitoring program should include, at a minimum, quarterly measurements of water level, water temperature, major dissolved ions, total dissolved solids, and BTEX components.

5. The Plan recommends the use of INJECTROL U as a chemical shut-off fluid, yet little chemical description is provided, aside from stating that is a sodium silicate material. Please provide any available material safety data sheets for the chemical shut-off fluids under consideration. Also, please discuss how the chemical shut-off fluids are predicted to behave in the presence of elevated dissolved solids, and BTEX compounds. Any description(s) of their use in geologic settings comparable to those at this well site would be very helpful.

Please respond to these issues within 14 days of your receipt of this letter. If you have any questions about these matters, you may contact Nathan Wiser, of my staff, at (303) 312-6211.

Sincerely,

Connally E. Mears

Connally E. Mears, Director
Technical Enforcement Program

cc: Deb Madison, Ft. Peck Tribes

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
http://www.epa.gov/region08

CONCURRENCE COPY

Ref: 8ENF-T

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

JAN - 3 2001

Steven Leifer
Baker Botts L.L.P.
The Warner
1299 Pennsylvania Avenue, NW
Washington, D.C. 20004-2400

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Biere 1-22 Production Well
East Poplar Oil Field
Roosevelt County, Montana

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8ENF-T NW 1-3-2001 8RC SBm 1/3/01 JHe 8ENF-L 1/3/01 1/3/01

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Please respond to these issues within 14 days of your receipt of this letter. If you have any questions about these matters, you may contact Nathan Wiser, of my staff, at (303) 312-6211.

Sincerely,

Connally E. Mears, Director
Technical Enforcement Program

cc: Deb Madison, Ft. Peck Tribes

bcc: Jim Eppers, 8ENF-L
Steven Moores, 8RC

7000 1670 0006 8877 1567

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Sent To Deb Madison, Ft. Peck Tribes
Environmental Programs Manager
P.O. Box 1027
Poplar, MT. 59255

Street, A

City, State,

PS Form 3800, May 2000 — See Reverse for Instructions

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To Steven Leifer
Baker Botts L.L.P. The Warner
1299 Pennsylvania Avenue, NW.
Washington, D.C. 20004-2400

Ser

Street, Apt. No.,

City, State, ZIP+4

PS Form 3800, May 2000 — See Reverse for Instructions

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STEVEN L. LEIFER
202-639-7723
E-Mail: sleifer@bakerbotts.com
Facsimile: 202-585-1040

January 17, 2001

VIA OVERNIGHT MAIL

Mr. Nathan Wiser
U.S. Environmental Protection Agency
Office of Enforcement, Compliance, and Environmental Justice
Technical Enforcement Program (8ENF-T)
999 18th Street, Suite 500
Denver, CO 80202-2466

Re: Biere Well Site, East Poplar Oil Field

Dear Mr. Wiser:

Thank you for reviewing Pioneer's "Proposed Biere 1-22 Well Response Action Plan" so expeditiously. In response to the questions and comments contained in Connally Mears' January 3 letter, we offer the following information compiled by our in-house technical staff in conjunction with our outside consultants.

1. Possible re-entry into the Biere 1-22 well bore

Response: Pioneer appreciates EPA's interest in preventing vertical migration through a possible re-entry into the well bore itself. However, mechanical well bore conditions, in our opinion, make this approach extremely hazardous and environmentally risky. The 2 7/8" tubing is cemented inside the 5 ½" casing and it would be necessary to drill out with a "metal muncher" or a mill. Our drilling department personnel do not think we can complete this operation without milling through the 5½" casing and deviating out of the well bore and into surrounding formation. At this point, we would be creating another pathway for a possible leak.

In any event, we believe our recommended chemical injection program will provide an effective barrier to vertical migration since the chemical will fill and seal off any channels and fractures around the Biere 1-22 well bore. The chemical will be injected into the Judith River at pressures below the fracture gradient so that no new fractures are created in the Judith River or surrounding formations.

2. Possible change to the spacing of the three proposed injection wells

Response: Spacing the wells equilaterally about the Biere 1-22 well bore would indeed be advisable if we were only using three wells to effect a complete 360° seal. However, we also intend, if necessary, to use the relief well as a chemical squeeze injection well after it is initially used to monitor the movement of the Injectrol-U chemical pumped into the other three wells. The relief well will be re-entered and cleaned out to the Judith River prior to chemical injection into the other wells, and then will serve as an excellent monitor well at depth to assess the efficacy of the seal.

We expect that the chemical injection program from the three injection wells will expand enough to reach the relief well. But if necessary, injection will occur into the relief well to seal off that well and provide additional encapsulation for the Biere 1-22 well bore.

3. Conducting both re-entry into the Biere well and chemical injection into four wells

Response: Pioneer believes that the four well injection pattern will provide an effective seal in and around Biere 1-22 well bore at the Judith River formation. Since injection ceased into the Judith River in approximately 1997, a lasting permanent seal at the Judith River is expected. Since (i) injection into the Judith River ceased in 1997, resulting in a decrease in pressure, and (ii) chemical injection will occur below the fracture gradient, the Judith River is no longer expected to be a contamination source.

The ability to initially monitor the results of injection into the three injection wells by the old relief well bore will enhance our probability of success. Once we cease use of the relief well as an observation well, then we can adjust our chemical injection into the relief well based on our monitored squeeze results in the three injection wells. Finally, as stated above, re-entry is not advisable given the high risk that a breach of the integrity of the Biere 1-22 well bore will provide additional pathways for the escape of contaminants into the environment.

4. Additional description of the monitoring program of the old relief well

Response: As noted above, the old relief well will be re-entered and cleaned out to the Judith River (original total depth) and then used as an observation well during the chemical injection phase of Pioneer's response program. Once it is determined that injection was successful, chemical will be injected into the relief well to complete the permanent seal in the Judith River in and around the Biere 1-22 well bore. It is the eight previously installed monitor wells drilled down to the Bearpaw Shale, rather than the relief well, which will provide the principal means of monitoring site conditions. (See wells labeled PNR 4-10 and 12 on the enclosed map, Tab A.) In addition, USGS and residential wells will be used to provide additional data points. These eight wells will initially be monitored on a quarterly basis to include water levels, temperature, major dissolved ions, total dissolved solids and BTEX components. Pioneer is developing a monitoring plan which sets forth our proposed monitoring program in more detail.

5. Request for Injectrol-U MSDS sheets, comparable case histories, and description of how the chemical will behave in the presence of elevated dissolved solids and BTEX compounds

Response: The MSDS sheet for this product is enclosed (Tab B). The ingredients are food grade products and should not present any hazard to the aquifer. We will use a pre-flush ahead of injection to provide a clean path for the injected chemical. Halliburton also will run compatibility tests on a sample of the Judith River fluids to determine whether additives are necessary to ensure that the injected material will accomplish its intended purpose in this particular soil/water matrix. We are assembling information on the use of Injectrol-U or similar substances in other remedial projects, and will provide this information in the near future.

We trust this information addresses the comments contained in Mr. Mears' letter. To expedite the process of agreeing on a response action program, we suggest that Pioneer and its technical consultants visit with you and your colleagues at your offices in the very near future. We can then discuss and resolve any outstanding technical issues. I will contact you soon to ascertain your availability for such a meeting.

In the meantime, please don't hesitate to call with any questions.

Sincerely,

Steven Leifer

Steven L. Leifer

Enclosures

c: Jennifer G. Fry, Pioneer Natural Resources USA, Inc.
Wilbur Dover, Pioneer Natural Resources USA, Inc.
Steve Mamerow, Pioneer Natural Resources USA, Inc.
John W. Ross, The Brown Law Firm

A

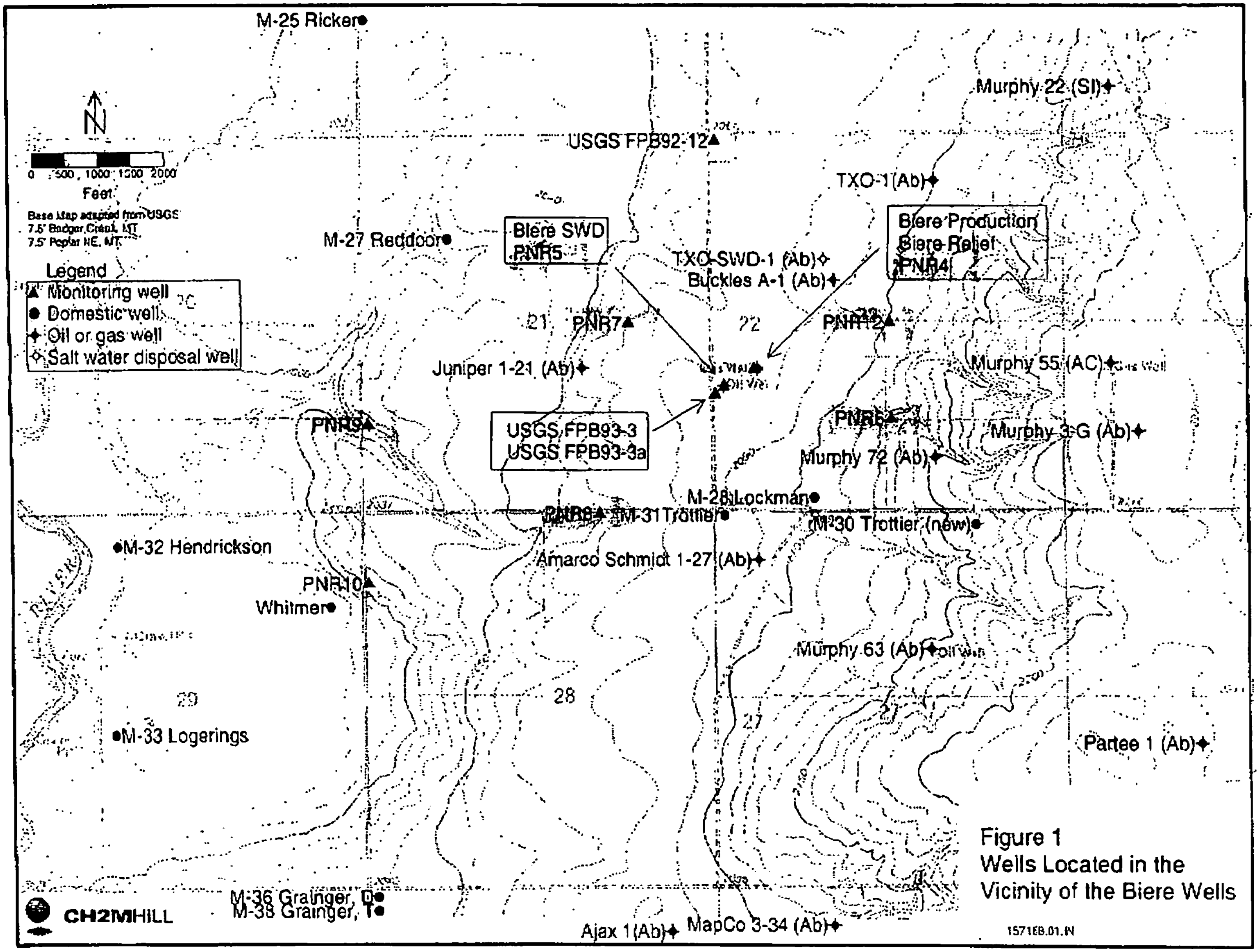

Figure 1
Wells Located in the Vicinity of the Biere Wells

B

Revised: 2000-08-11
Product: INJECTROL U
<<...OLE_Obj...>>
MATERIAL SAFETY DATA SHEET
INJECTROL U
Revision Date: 08/11/2000
Date of Printing: 08/11/2000

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
Product Trade Name: INJECTROL U
Synonyms: None
Chemical Family: Silicate
Application: Resin
Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (800) 666-9260 or (713) 676-3000
Prepared By
Product Stewardship
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS
Substance Weight Percent (%) ACGIH TLV-TWA OSHA PEL-TWA
Sodium silicate 1344-09-8 30 - 60% Not applicable Not applicable

3. HAZARDS IDENTIFICATION
Hazard Overview
May cause respiratory irritation. May cause eye and skin burns.

4. FIRST AID MEASURES
Inhalation
If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.
Eyes
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.
Ingestion
Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.
Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES
Flash Point/Range (F): Not Determined
Flash Point/Range (C): Not Determined
Flash Point Method: Not Determined
Autoignition Temperature (F): Not Determined
Autoignition Temperature (C): Not Determined
Flammability Limits in Air - Lower (%): Not Determined
Flammability Limits in Air - Upper (%): Not Determined
Fire Extinguishing Media

Water. Carbon Dioxide, Dry Chemical, Foam.
Special Exposure Hazards
Decomposition in fire may produce toxic gases.
Special Protective Equipment for Fire-Fighters
Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Flammability 0. Reactivity 0, Health 1
6. ACCIDENTAL RELEASE MEASURES
Personal Precautionary Measures
Use appropriate protective equipment.
Environmental Precautionary Measures
Prevent from entering sewers, waterways or low areas.
Procedure for Cleaning/Absorption
Isolate spill and stop leak where safe. Neutralize to pH of 6-8. Scoop up and remove. Do NOT spread spilled product with water.
7. HANDLING AND STORAGE
Handling Precautions
Avoid contact with eyes, skin, or clothing. Avoid breathing vapors.
Storage Information
Store away from acids. Store in a cool well ventilated area. Keep container closed when not in use.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION
Engineering Controls
Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.
Respiratory Protection
Dust/mist respirator.
Hand Protection
Impervious rubber gloves.
Skin Protection
Full protective chemical resistant clothing.
Eye Protection
Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions
Eyewash fountains and safety showers must be easily accessible.
9. PHYSICAL AND CHEMICAL PROPERTIES
Physical State: Liquid
Color: Clear to hazy
Odor: Slightly soapy
pH: 11.3
Specific Gravity @ 20 C (Water=1): 1.4
Density @ 20 C (lbs./gallon): 11.66
Bulk Density @ 20 C (lbs/ft3): Not Determined
Boiling Point/Range (F): 213
Boiling Point/Range (C): 100
Freezing Point/Range (F): 30
Freezing Point/Range (C): -2
Vapor Pressure @ 20 C (mmHg): 156
Vapor Density (Air=1): Not Determined
Percent Volatiles: 80
Evaporation Rate (Butyl Acetate=1): Not Determined
Solubility in Water (g/100ml): Soluble
Solubility in Solvents (g/100ml): Not Determined
Solubility in Sea Water (g/100ml): Not Determined
VOCs (lbs./gallon): Not Determined
Viscosity. Dynamic @ 20 C
(centipoise): Not Determined
Viscosity, Kinematic @ 20 C
(centistrokes): Not Determined
Partition Coefficient/n-Octanol/Water: Not Determined
Molecular Weight (g/mole): Not Determined
10. STABILITY AND REACTIVITY
Stability Data: Stable

Hazardous Polymerization: Will Not Occur
Conditions to Avoid
None anticipated
Incompatibility (Materials to Avoid)
Contact with acids. Amphoteric metals such as aluminum, magnesium, lead, tin, or zinc.
Hazardous Decomposition Products
Toxic fumes.
Additional Guidelines
Not Applicable

11. TOXICOLOGICAL INFORMATION
Principle Route of Exposure
Eye or skin contact. inhalation.
Inhalation
Causes severe respiratory irritation.
Skin Contact
Causes severe burns.
Eye Contact
May cause eye burns.
Ingestion
Causes burns of the mouth, throat and stomach.
Aggravated Medical Conditions
Skin disorders.
Chronic Effects/Carcinogenicity
No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information
None known.
Toxicity Tests
Oral Toxicity: LD50: 2000-3000 mg/kg (Rat)
Dermal Toxicity: Not determined
Inhalation Toxicity: Not determined
Primary Irritation Effect: Not determined
Carcinogenicity: Not determined
Genotoxicity: Not determined
Reproductive/Developmental
Toxicity: Not determined

12. ECOLOGICAL INFORMATION
Mobility (Water/Soil/Air)
Not determined
Persistence/Degradability
Not determined
Bio-accumulation
Not Determined
Ecotoxicological Information
Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined
Chemical Fate Information
Not determined
Other Information
Not applicable

13. DISPOSAL CONSIDERATIONS
Disposal Method
Disposal should be made in accordance with federal, state and local regulations.
Contaminated Packaging
Empty container completely. Transport with all closures in place. Return for reuse or disposal in a sanitary landfill according to national or local regulations.

14. TRANSPORT INFORMATION
Land Transportation
DOT
Not restricted

Canadian TDG
Not restricted
ADR
Not restricted
Air Transportation
ICAO/IATA
Not restricted
Sea Transportation
IMDG
Not restricted
Other Shipping Information
Labels: None

15. REGULATORY INFORMATION

US Regulations
US TSCA Inventory
All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances
Not applicable
EPA SARA (311,312) Hazard Class
Acute Health Hazard
EPA SARA (313) Chemicals
This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product
Not applicable.
EPA RCRA Hazardous Waste Classification
If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65
All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law
Does not apply.
NJ Right-to-Know Law
Does not apply.
PA Right-to-Know Law
Does not apply.
Canadian Regulations
Canadian DSL Inventory
All components listed on inventory.
WHMIS Hazard Class
E Corrosive Material

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable
Additional Information
For additional information on the use of this product, contact your local Halliburton representative.
For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Product Stewardship at 1-580-251-4335.
Disclaimer Statement
This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

Monitoring Plan for the Shallow Groundwater

Biere Well Response Action Project
Pioneer Natural Resources USA, Inc.

January 30, 2001

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INTRODUCTION

The Biere well, Figure 1, was drilled in 1972 by Mesa Petroleum. Through subsequent business successions and acquisitions the Biere well is now the responsibility of Pioneer Natural Resources USA, Inc. In response to indications that the Biere well was allowing thermal brines from oil producing and/or brine injection zones to communicate with and impact the shallow drinking water aquifer, Pioneer Natural Resources conducted a field investigation in the Biere well area, (Field Investigation Report, Biere Well Evaluation (CH2M Hill, August 2000).

In a parallel task, Pioneer Natural Resources evaluated the construction history of the Biere well and prepared a proposed plan to re-seal the well (Proposed Biere # 1-22 Well Response Action Plan, Pioneer Natural Resources, December, 2000). As presented in the Response Action Plan, the existing Biere relief well will be temporarily re-opened to monitor in-situ conditions during the placement of the primary sealant in the three temporary injection wells installed around the Biere well. Once the sealant is injected into the wells, the Biere relief well will also be injected with the sealant, as necessary, and abandoned.

This Monitoring Plan describes the post-remediation monitoring to be conducted to track and evaluate the effects re-sealing the Biere well has on the shallow drinking water aquifer.

HYDROGEOLOGIC SYSTEM

The conceptual model of the shallow groundwater system in the study area consists of a thin (5 to 20 feet typical thickness) aquifer of Quaternary sand and gravel deposits that are widely present on top of the underlying Cretaceous Bearpaw Shale. The shallow aquifer has highly variable hydraulic properties depending on the thickness of the sand

and gravel and the amount of fine- grained materials (silt and clay) included in the aquifer. The aquifer is present between the Bearpaw Shale and overlying till. In the study area the gradients in the shallow are generally toward the Poplar River to the west-southwest. The shallow aquifer in the study area merges laterally with, and discharges into, the alluvial aquifer present along the current Poplar River drainage which flows generally north to south approximately 2 miles west of the Biere well area.

Sources of recharge to the shallow aquifer beneath the study area are only generally identified. There are five potential sources of recharge:

1. Direct infiltration of precipitation
2. Lateral inflow of infiltration from highlands to the east
3. Diffuse and/or localized vertical leakage from underlying saline aquifer(s) through structural weaknesses or zones of higher vertical permeability in the Bearpaw Shale
4. Point source leakage from deep saline aquifer(s) via well bores
5. Direct infiltration of fugitive saline fluids stemming from the production of oil and the subsequent storage, transporting, pumping and disposing of this waste water

There is insufficient information available to proportion the recharge between the various sources of water. Some or all of these recharge sources may be active locally across the study area.

The pre-Biere well water quality of the shallow aquifer in the study area is unknown. Using the lowest specific conductivity value reported, and assuming there were no localized natural sources of saline water leakage, the pre-oil field water quality background probably ranged from 1,500 to 2,500 microsiemens per centimeter (uS/cm), which equates to an approximate total dissolved solids (TDS) concentration of 1,100 to 1,500 milligram per liter (mg/l). The dominant ions in the background water are calcium, magnesium and bicarbonate.

Brines in the bedrock saline aquifers and oil production zones beneath the study area have TDS concentrations of 80,000 to 120,000 mg/l and are predominantly sodium chloride. Leakage of these brines via natural pathways, leaking wells or from fugitive water released during current and historic handling of the brines has produced localized areas within the shallow aquifer where the water chemistry has been changed from predominantly calcium-magnesium bicarbonate to predominantly sodium chloride. In addition, organic compounds typically associated with the production of petroleum; benzene, ethyl benzene, toluene and xylene (BTEX) have been detected in the shallow groundwater in the study area.

In the immediate vicinity of the Biere well, groundwater in the shallow aquifer is now a predominantly sodium chloride water with a TDS of about 65,000 mg/l. This fact, and the observations of elevated temperature and water level (head) near the Biere well, indicates that the Biere well is an active source of brine leakage into the shallow aquifer.

Elevated heads in the shallow aquifer near the Biere well appear to be a localized impact and the thermal signature quickly dissipates with distance away from the Biere well. The sodium chloride dominated shallow water chemistry signature reveals a relatively constrained chloride plume extending to the west from the Biere well. The westward flow component is also supported by the detection of benzene in monitoring well PNR-7 about 2000 feet west-northwest of the Biere well.

It is difficult to track the extension of the chloride plume from the Biere well more than about one-half mile to the west with any certainty. Benzene is not present above detectable limits in more distant wells and sodium chloride concentrations tend to blend in with the general water chemistry of the aquifer. In addition, there are numerous active and historical oil wells, brine injection and brine handling facilities, in and adjoining the study area, any of which may have in the past or be actively contributing sodium chloride and BTEX compounds to the shallow aquifer chemistry. More specifically, data collected by Pioneer Natural Resources during the field investigation suggests the possibility of one or more additional active sources of brine and BTEX compounds south-southeast of the Biere well. In addition, data collected by the USGS and EPA indicates a separate area contributing high TDS water and chlorides adjacent to, and probably intermingling with the northwest extension of the chloride plume from the Biere well.

The difficulty in tracking diffuse plume signatures and in assigning or proportioning recharges sources by chemistry impacts is simply that there appears to be no significant characteristic to differentiate between the numerous and various sources of brine. All brine sources impacting the shallow aquifer, whether from specific wells owned by any of the various oil companies, from years of brine handling across the study area by the many well owners, operators and service companies, or from natural leakage, are all predominantly sodium chloride. Active or recent sources of brine may also carry a BTEX component.

It is within this convoluted mixture of real and potential sources of the same contaminants that the proposed monitoring program must operate to provide meaningful evaluation of the effectiveness of the proposed remedial measures to be implemented on the Biere well.

MONITORING PLAN

Purpose

The proposed monitoring plan is focused on two primary objectives:

1. Evaluation and confirmation that the leakage from the Biere well has been curtailed by the proposed Response Action Plan
2. Confirmation, by observation of water chemistry changes, of the area impacted by leakage from Biere well

Monitoring Program

The proposed monitoring plan encompasses two simultaneous monitoring programs to meet these objectives, 1) quarterly testing of shallow monitoring wells near the Biere well and 2) semi-annual monitoring of more distant wells. Assuming long-term access agreements can be obtained from the controlling agencies and private well owners, the specific wells in each group are as follows:

Quarterly Monitoring

PNR 4	PNR 5
PNR 6	PNR 7
PNR 12	USGS FPB 92-3
USGS FPB 92-12	M-28 (Lockman)
M-31 (Trottier)	

Semi Annual Monitoring

PNR 8	PNR 9
PNR 10	M-27 (Reddoor)
Buckles-Whitmer	M-30 (Trottier new supply well)

The proposed monitoring program of quarterly and semi-annual sampling schedules is designed to accommodate expected changing dynamics near the Biere well versus the longer-term changes with flow distance (time). The quarterly sampling in the wells closest to the Biere well will provide better resolution in the area where significant and possibly rapid changes in water chemistry should occur. For the more distant down gradient wells and the background wells, the semi-annual sampling program will provide adequate characterization of the changes in the aquifer chemistry over time and improve the general knowledge of flow paths and chemistry trends in the aquifer. Well locations are provided on Figure 1.

Analyses

The proposed monitoring parameters for each group are identical and consist of:

Temperature*	Specific Conductivity*
pH*	Total Dissolved Solids
Sodium	Chloride
TPH	BTEX

Asterisks indicate field parameters. Temperature, specific conductivity and pH will be measured in the field as the well is being purged prior to sampling. Specific conductivity and pH will also be determined in the laboratory.

On an annual basis, all wells will be sampled for additional ions to allow water typing, to evaluate changes in other chemistry parameters and for use in establishing water chemistry relationships between wells. The supplementary parameters are:

Calcium	Magnesium
Potassium	Sodium
Total Hardness	Alkalinity
Bicarbonate	Carbonate
Nitrogen (Nitrate plus Nitrite)	

Sampling Procedures

Within one 24-hour period at the start of each sampling event, water levels will be measured in all wells for which access can be obtained and that are not being actively pumped. Wells M-30, Buckles-Whitmer, and possibly M-27, are active wells for which a water level measurement may not be feasible to collect.

All wells will be sampled in a generally "clean" to "dirty" sequence, based on previous sample data, beginning with the wells most distant from the Biere well and culminating with PNR 4.

All Wells Except PNR 4

These wells will be sampled using a variety of equipment depending on the physical condition of the well, depth to water, and the existence or availability of existing equipment. The monitoring wells and wells M-28 and M-31 will be sampled using a portable submersible sampling pump that is flushed and decontaminated between samples. Water level in well PNR 8 is too deep and the well does not make enough water to sample with a pump and therefore a Teflon bailer will be used to sample this well. Domestic wells M-30, Buckles-Whitmer and M-27 (if operational) will be sampled directly from the existing pump discharge from a faucet or tap that is not affected by any water softeners or filters.

Well PNR 4

This well has a thick accumulation of oil on the water surface and repeated monitoring of this well under these conditions is problematic. Therefore, prior to sealing the Biere well, PNR 4 will be retro-fitted in an attempt to allow sampling of the fluid in the shallow aquifer without first having to remove, handle and dispose of the accumulated oil. The initial conceptual approach is to equip the well with a secondary liner installed inside the current well casing. The liner will be equipped with a very limited screened interval (approximately the lower 6 inches maximum) and will be temporarily sealed to allow installation through the standing column of oil without filling the liner. Several options are being considered for the temporary plug ranging from a soluble solid (salt) to puncturing a membrane.

Once in place with the perforations at the very bottom of the water column the liner should not accumulate significant oil and therefore all monitoring and samples will use the liner. If a suitable pressure transducer, thermistor and conductivity probe can be located this well may be so equipped and only periodic confirmation samples and direct measurements will be collected. However, as of the date of this monitoring plan, no dedicated equipment capable of handling the elevated temperature and high conductivity anticipated for this well has been located.

Purge Water Handling

Water removed prior to sampling (purge water) will be contained at the wellhead for those wells sampled quarterly, except for FPB-12, PNR-6 and PNR-12. For those wells sampled on a semi-annual basis, and background wells FPB92-12, PNR-6 and PNR-12, pre-sample purge water will be discharged at the wellhead in a manner that does not cause erosion or ponding of water near the wellhead.

Containerized purge water will be transported from each well to a central storage location. At an average purge volume of about 10 gallons per well, each quarterly sampling event will generate about 60 gallons of contained purge water. The final containment and disposal method for the sample purge water cannot be identified at this time but will be established prior to initiating the sampling. The disposal options that are being considered are discussed in the following paragraphs.

Offsite Disposal. The specific conductivity of the containerized water will be measured and a sample collected for BTEX and TPH at the end of each sampling event. The results of this sample will be used to determine appropriate disposal of the contained liquid.

If the BTEX constituent concentrations are below their respective Maximum Contaminant Limit (MCL), it may be possible to contract with a local vacuum truck service to retrieve the water and dispose of it in the Poplar or Wolf Point sewage treatment system, assuming arrangements with either city can be obtained. If BTEX concentrations are above MCL's it may be necessary for the containerized water to be retrieved by a licensed waste oil hauler and shipped offsite for appropriate disposal.

Onsite Disposal. An option for disposal of purge water that works well in dry, windy environments such as exists in this area, is construction of a temporary, shallow, lined evaporation pond. A pond, approximately 10 feet square and 1 foot deep line with high density polyethylene (HDPE) will hold about 750 gallons if full. Each sampling event will produce about 60 gallons of purge water which will fill the pond about three-quarters of an inch deep. A location near PNR 5 would be ideal for a small evaporation pond in that it is flat, overlies the plume, is in an area previously disturbed by oil field brine disposal and is central to the study area.

Quality Assurance/Quality Control

Chain of Custody and Analytical Methods

All samples will be submitted following standard Chain of Custody (COC) protocols to a state approved, independent laboratory for analysis using the current EPA methods prescribed in SW-846. Laboratory detection and reporting limits will meet or exceed (be less than) the State of Montana or EPA groundwater protection standards for the specific compound or constituent. Laboratory QA/QC procedures for organic analyses, including Reagent Blanks and Surrogate Recovery Reports will be provided by the laboratory with each analytical report.

Field, Equipment and Travel Blanks

One set of field blanks, equipment blanks, and travel blanks will be collected during each sampling event to evaluate whether the organic sample results are being adversely impacted by secondary contaminant sources including cross contamination from equipment, bottle contamination or contaminants introduced during shipping. Because of the higher reporting limits, no QA/QC blanks will be collected for the non-organic constituents and parameters being analyzed for.

Because of the sensitivity of the analysis, BTEX samples will be stored and shipped separately from the other sample containers. Samples with known or suspected BTEX constituents will be stored and shipped separately from other BTEX samples. A travel blank will accompany each BTEX shipping container.

One field blank will be collected during each sampling event. The field blank will be prepared by pouring laboratory grade de-ionized water into a 40 ml vial to simulate ambient conditions at the well head when the actual BTEX sample was collected.

One equipment blank sample will be collected during each sampling event. As with the field blank, the specific well where the sample is collected will vary from event to event at the discretion of the sampling team. The procedure for the equipment blank will vary depending the sampling equipment being used. For bailed wells, if a re-useable bailer is being used, between uses the bailer will be washed and rinsed using soap, de-ionized water, a methanol rinse then followed by a second rinse of de-ionized water. Prior to collecting a sample with the bailer from a well designated to have an equipment blank collected, the bailer will be filled with laboratory grade, de-ionized water, then a 40 ml vial sample bottle will be filled from the bailer and submitted for BTEX analysis.

Equipment blank sample preparation for wells sampled by portable, non-dedicated, sample pumps will vary somewhat depending the type of pump used. To the extent possible, dedicated tubing will be used for each well to avoid cross contamination issues. The general procedure for pump decontamination and collection of equipment blanks is as follows. The pump will be washed and rinsed between uses and between wells by pumping approximately 1 gallon of a soap solution followed by 2 to 3 gallons of rinse water through the pump. If non-dedicated pump discharge hose is used the decontamination solution will be pumped through the tubing. The wash and rinse water will be directed over the pump electrical cable to simultaneously decontaminate the wire. An equipment blank will be prepared by inserting the pump into a source of laboratory grade de-ionized water and collecting a sample in a 40 ml vial following the same procedures as would be followed in collecting a normal sample. The equipment blank sample will be submitted for BTEX analysis.

Duplicate Samples

Periodically, at the discretion of the project team, blind duplicate samples may be collected and submitted for analysis. In general duplicate samples will be used to verify BTEX results in pertinent wells. Blind duplicates will be collected by sequentially filling two sets of 40 ml vials from the sample pump discharge stream. One set will be fully labeled, including well number, date and time; the duplicate set of vials will be labeled with simple identifier but will not include date or time. Duplicate samples will be submitted under COC protocols with the normal samples. The specific well(s) from which duplicate samples will be collected, in any, have not been established.

Split Samples

Split samples (duplicate samples sent to two different laboratories) are not anticipated at this time. However, Pioneer may submit split samples for several reasons, including questions or concerns about the accuracy of the laboratory or to provide data for comparison of laboratories. It is also anticipated that interested parties or regulatory agencies may request split samples for submission to their own independent laboratories. Pioneer will attempt to accommodate requests for split samples by providing access to the sample discharge streams during a scheduled sampling event so the requesting party can collect their own samples.

MONITORING SCHEDULE AND DURATION

To provide a better baseline on the shallow aquifer water chemistry, samples will be collected from all wells immediately prior to the onset of remedial measures at the Biere well. Following remediation, the proposed quarterly and semi-annual sampling schedule will be initiated. Quarterly sampling will typically be conducted in March, June, September and December. Semi-annual sampling will be conducted in March and September. The schedule for winter and spring sampling events will be flexible to avoid inclement weather. To the extent possible the samples will be collected during the same annual time frame to allow seasonal comparison of water chemistry trends.

The results of each sampling event will be submitted to the appropriate regulatory agencies for general information. Unless obvious and immediate changes to the monitoring program are warranted based on these periodic submissions, the monitoring program will be conducted under this schedule for a period of two years (8 quarters) after the Biere well remediation is completed. At the end of this period the results of the 8 quarterly samples and 4 semi-annual samples will be combined with the existing water chemistry data and presented in a written report to the regulatory agencies. The report will provide analysis of the results relative to the two objectives of the monitoring program. It is anticipated that the monitoring report will also provide the basis for discussions with the agencies regarding any modifications to the monitoring program or if additional remedial actions are warranted.

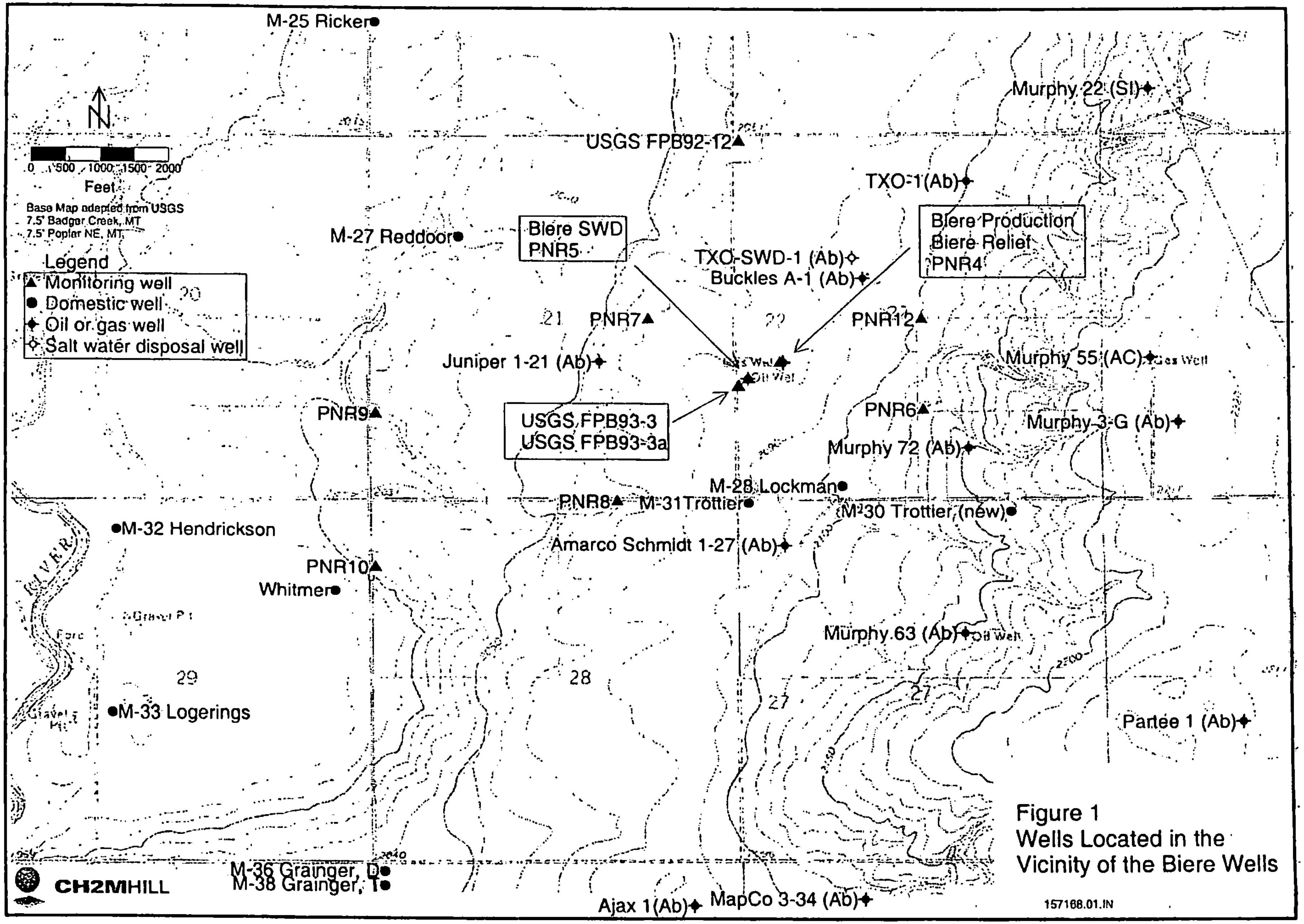

Figure 1
Wells Located in the Vicinity of the Biere Wells

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STEVEN L. LEIFER
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Facsimile: 202-585-1040

February 2, 2001

VIA OVERNIGHT MAIL

Mr. Nathan Wiser
U.S. Environmental Protection Agency
Office of Enforcement, Compliance, and Environmental Justice
Technical Enforcement Program (8ENF-T)
999 18th Street, Suite 500
Denver, CO 80202-2466

Re: Biere Well Site, East Poplar Oil Field

Dear Mr. Wiser:

Enclosed please find Pioneer's Monitoring Plan for the Shallow Groundwater. This Plan outlines a monitoring program Pioneer intends to undertake following the remediation of the Biere well in order to assess the efficacy of such remediation. We would welcome comment from the Agency on the Monitoring Plan.

If you have any questions concerning the Plan, please contact me or Wilbur Dover at Pioneer.

Sincerely,

Steven L. Leifer

Enclosure

c: Mark Skeen/Jennifer G. Fry, Pioneer Natural Resources (via reg. mail, w/o encl.)
Wilbur Dover/Steve Mamerow, Pioneer Natural Resources (")
John W. Ross, The Brown Law Firm (")

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DC01:281265.1

REVIEW AND COMMENTS ON "Monitoring Plan for Shallow Groundwater– Biere Well Response Action Project, January 30, 2001"

Mike Gansecki, EPA Region VIII
March 19, 2001

Introduction

I was asked to review the above document and provide design recommendations for the well monitoring plan, including possible additional well locations. To assist in the review, I was also provided copies of the documents: "Field Investigation, Biere Well Evaluation, Poplar Montana", CH2M-Hill, August 2000; and "Saline-Water Contamination in Quaternary Deposits and the Poplar River, East Poplar Oil Field, Northeastern Montana", USGS Water Resources Investigations Report 97-4000, Thamke & Craig, May 1997. With the exceptions discussed below, the overall monitoring plan appears reasonable.

The essence of the monitoring program as presented is to determine whether actions taken to stop flows from an abandoned brine disposal well have been successful. Present information indicates highly saline shallow ground water in the vicinity of the Biere disposal well supplemented by temperature information, indicating a roughly spherical mound emanating from a location near the well. Associated measured chloride (Cl) and total dissolved solids (TDS) are indicative of a brine or brine well source typical of historical East Poplar oil field activities.

A secondary purpose of the monitoring program would be to establish current baseline conditions in an appropriate vicinity around the likely source. In the monitoring plan, it is proposed to measure the parameters: Temperature*, pH*, Sodium (Na), Total Petroleum Hydrocarbons (TPH), Specific Conductance*, TDS, chloride (Cl) and BTEX (unspecified analysis for Benzene, Toluene, Ethylbenzene and Xylene perhaps using a gas chromatographic technique). Asterisked parameters are to be measured in the field. Piezometric surface measurements would also be collected for each sampling event. The plan proposes quarterly monitoring of all parameters for the following 8 existing wells: PNR4, PNR5, PNR6, PNR7, USGS wells 92-12 and 93-3 (sic), M-28 (Lockman well) and M-31 (Trottier well). Semi-annual monitoring for the same parameters is proposed for 6 additional existing wells: PNR8, PNR9, & PNR10, M-27 (Reddor well), the Buckles-Whitmer well, and M-30 (Trottier new supply well). On an annual basis, all wells will be sampled for additional major chemistry parameters: Ca, K, Na, Mg, Total Hardness, Bicarbonate, Nitrogen, Alkalinity, and Carbonate.

Analysis

Central to any proposal for a monitoring plan well system is an understanding of the key objectives of the study. As mentioned above, two major goals are identified: 1) the ability to determine success/failure of the remediation to the likely well source; and 2) development of current baseline conditions. In reality, the two objectives are related. One must also anticipate the types of evaluations which might be used to define these objectives. It is also fundamental to anticipate currently identified problems and information gaps in present knowledge. A number of the latter are listed below:

1) The well location demonstrating maximal contaminant concentrations (temperature and organic hydrocarbons) is PNR4. However, this well contains a sizeable layer of free oil product which constrains routine sampling. Special techniques have been proposed in the monitoring plan to deal with the problem. However, it is somewhat uncertain whether reliable data can routinely be obtained for the study;

2) There appears to be some uncertainty as to the exact areal location of the "source". While it is believed that the disposal well lies very close to well PNR5, there is also an abandoned production/relief well to the northeast apparently lying close to well PNR4. Temperature data appeared to be at a maximum in well PNR4. But no Cl, specific conductance or TDS data were reported for this well, probably because of the free oil product. In its absence, maximum inorganic constituent values are centered on PNR5;

3) Information from the field investigation report indicates that well PNR6 appears to be installed in a portion of the shallow aquifer having different water chemistry properties and perhaps having only limited contact with aquifer zones containing contamination;

4) An uplift to the east of the site trending roughly SSW-NNE with elevated topography (perhaps 1000+ feet higher) possibly confines eastward plume migration;

5) Water chemistry information for well PNR8 demonstrates a less saline condition than is consistent with other shallow wells, and may also be isolated from the main body of saline water or is outside of one or more preferential flow paths;

6) Potentiometric regional contour maps suggest a roughly east to west groundwater flow towards the Poplar River with some southerly component (in the absence of local discharges and mounding);

7) TDS, specific conductance, and CL contour information suggesting possible groundwater movement northwest towards well PNR7. The shape of the contour lines is also heavily influenced by the lack of data and may only be an artifact of the contouring routine;

8) Low BTEX contamination in well PNR7 suggesting potential contamination movement towards the northwest, but also similar contamination in wells M-28 and M-31 suggesting movement to the south/southwest; and

9) Contour lines for CL, specific conductance, and TDS showing elevated levels to the south of the source in wells M-28 and M-31, but limited due to lack of sufficient data points further south.

These disparate pieces of information suggest spatial areas where gaps are present, which could be supplemented through installation of additional wells. Since the contamination problem is clearly a spatial one of considerable extent, spatial contouring or even more sophisticated statistical analyses such as Kriging might be applicable to the data. Were present data analysed with a two-dimensional form of Kriging, error analyses could be generated to more formally identify areas of largest uncertainty where additional sampling points might prove useful.

In the absence of such formal analyses, it is still possible to make some initial judgements as to where supplemental sampling can improve knowledge of the situation and allow for better future evaluations of remediation progress. Since we are dealing with spatially extended data, it is a truism that roughly uniformly spaced sampling locations provide the best overall mapping information. A second generalization is that information nearest the source is likely to be the most problematic and that additional sampling density is probably warranted.

At this site, existing well locations lie at fairly large distances from each other. If the nature of the plume(s) is such that spatial relationships are fairly uniform over large distances, then a spacing pattern with wells roughly 1000-2000' apart may be sufficient (with the exception noted nearest the source).

At present, none of the reports provided estimates of expected groundwater travel times at the site. There probably has been sufficient information collected to make some preliminary estimates, but no calculations were provided. This becomes important in considering what time frames are expected for potentially observable changes to any of the measured parameters following remedial activities. Since it may be important to have a sense of potential success within the prescribed monitoring time frames (minimum of 3 months up to one to two years), inter-well distances nearest to and at the source should probably be shorter. In the absence of better information and estimating travel times of 10-100'/year, this would suggest nearest well distances of perhaps 100-200' might be necessary to monitor shorter-term changes.

In addition to the uncertainty regarding areas nearest the source, four other important areas from above should be considered. 1) The areas towards the northwest are suggested as one possible direction of plume movement; 2) areas to the south of wells M-31 and M-28 also have no monitoring wells. Given the high TDS/CL values and potential BTEX contamination in the wells, this should be considered an important area of potential groundwater movement; 3) discordances in the area around well PNR8 to the southwest; and 4) other areas within ½ mile of the source lacking information.

Recommendations

Based on the above considerations, the attached map Figure 1 is provided suggesting additional well sampling locations. In total, ten new well locations are suggested. Assuming a source somewhere in the vicinity of the existing Biere location shown as a black dot, a roughly orthogonal array of wells was developed. To the greatest extent, existing wells were included in the framework. Thus, proposed wells #3, #4 and #6 along with either well PNR5 or USGS93-3 lie in four perpendicular directions approximately 500' from the probable source. Water chemistry and temperature data suggest that wells PNR5 and USGS93-3 provide nearly identical information and one may be redundant. A additional proposed well #10 is shown with a question mark. It might be useful to consider locating a new well between the Biere disposal and production wells in the hopes of avoiding the extensive oil contamination yet still serving as the maximum source well in the monitoring system.

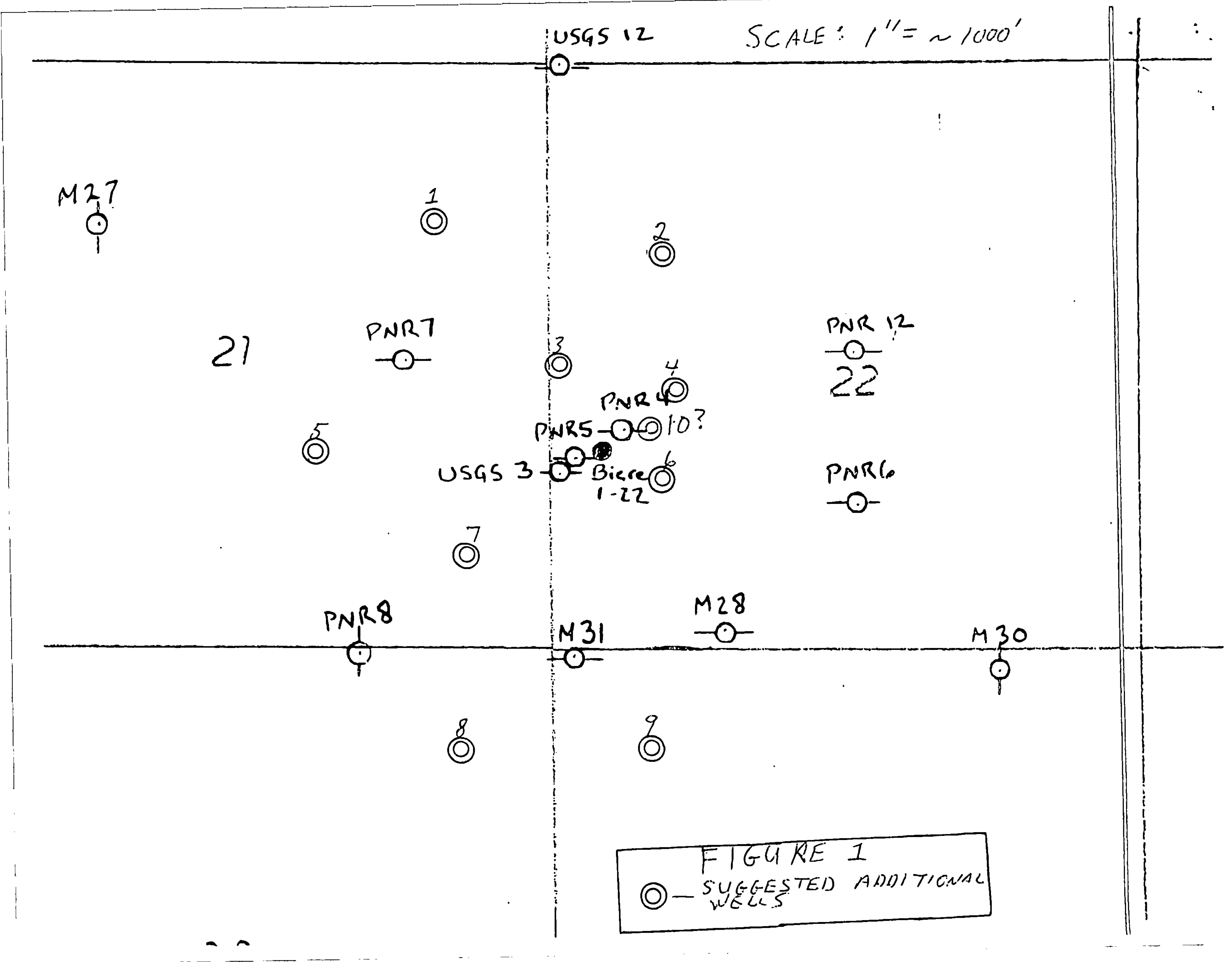
Proposed wells #7, #8, and #9 are suggested to fill in critical information gaps towards the south and also provide additional information (at wells #7 and #5) regarding presently observed anomalies at existing well PNR8. Proposed wells #1, #2, and 5# are also located to provide improved spatial information for areas to the west and north.

Finally, it is recommended that existing well PNR8 be included in the quarterly monitoring scheme rather than the semi-annual group. The remainder of the more distant monitoring wells proposed in the plan can continue on a semi-annual monitoring basis. Although potentiometric measurements are proposed for each sampling event in the plan, the measurement should be noted as an additional parameter for this study, since potentiometric changes might occur faster than chemical ones.

As a last caveat, it should be noted that these suggestions are based on the only information available to me at present. If these 9 or 10 wells are installed and the monitoring begun, new patterns might become apparent which could imply the need for a few additional wells in one or more areas. With 18-20 well sampling points in the quarterly analyses (supplemented by more remote information from 5 outlying wells), an improved picture of the current contaminant distribution(s) can result.

Since my areas of experience lie more with statistical analysis and aqueous chemistry rather than geohydrology, our hydrologist Randall Breeden also reviewed these comments. He is comfortable with the recommendations. I will be on annual leave until April 4. If there are additional questions, please call Randy at x6522.

Figure


USGS 12
SCALE: 1" = ~1000'
M27
1
2
21
PNR7
3
PNR 12
4
22
PNR4
PNR5
10?
5
USGS 3
Biere 1-22
6
PNR6
7
M28
PNR8
M31
M30
8
9
FIGURE 1
SUGGESTED ADDITIONAL WELLS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 300
DENVER, CO 80202-2466
http://www.epa.gov/region08

MAR 28 2001

Ref: 8ENF-T

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Steven Leifer
Baker Botts L.L.P.
The Warner
1299 Pennsylvania Avenue, NW
Washington, D.C. 20004-2400

Re: Comments on January 30, 2001 Proposed Monitoring Plan for the Shallow Groundwater
Pioneer Natural Resources USA, Inc.
Biere 1-22 Production Well
East Poplar Oil Field
Roosevelt County, Montana

Dear Mr. Leifer:

The United States Environmental Protection Agency ("EPA") appreciates the opportunity to comment on the Monitoring Plan for the Shallow Groundwater, dated January 30, 2001, (the "Plan") proposed by Pioneer Natural Resources USA, Inc. ("Pioneer") in the vicinity of the Biere 1-22 well. Nathan Wiser, of my staff, has consulted with other groundwater monitoring well design experts in the office, as well as the United States Geological Survey ("USGS") in the preparation of this letter. We appreciate your continued willingness to seek EPA's comments on these matters.

Pioneer appears to have put forth considerable effort to develop a Plan to address the Biere 1-22 well contamination, the monitoring of whose solution is more complex than would otherwise be expected in a single contaminant point source setting. Two major goals are identified in the Plan: (1) the ability to determine success (or failure) of the remediation of the Biere 1-22 well, and (2) to determine the area of the aquifer affected by the Biere 1-22 well. The following comments are meant to assist Pioneer to better attain these goals.

Additional Monitoring Well Locations

The Plan proposes to monitor groundwater at a total of 15 sites, including 5 wells that either are now or were previously privately owned water supply wells, 2 wells installed by the USGS, and 8 wells installed by Pioneer in 2000. The number of proposed monitoring well sites is

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Please address these comments in a revised Plan within 30 days of your receipt of this letter. If you have any questions, please contact Nathan Wiser of my staff at (303) 312-6211.

Sincerely,

Connally E. Mears

Connally E. Mears, Director
Technical Enforcement Program

Enclosure

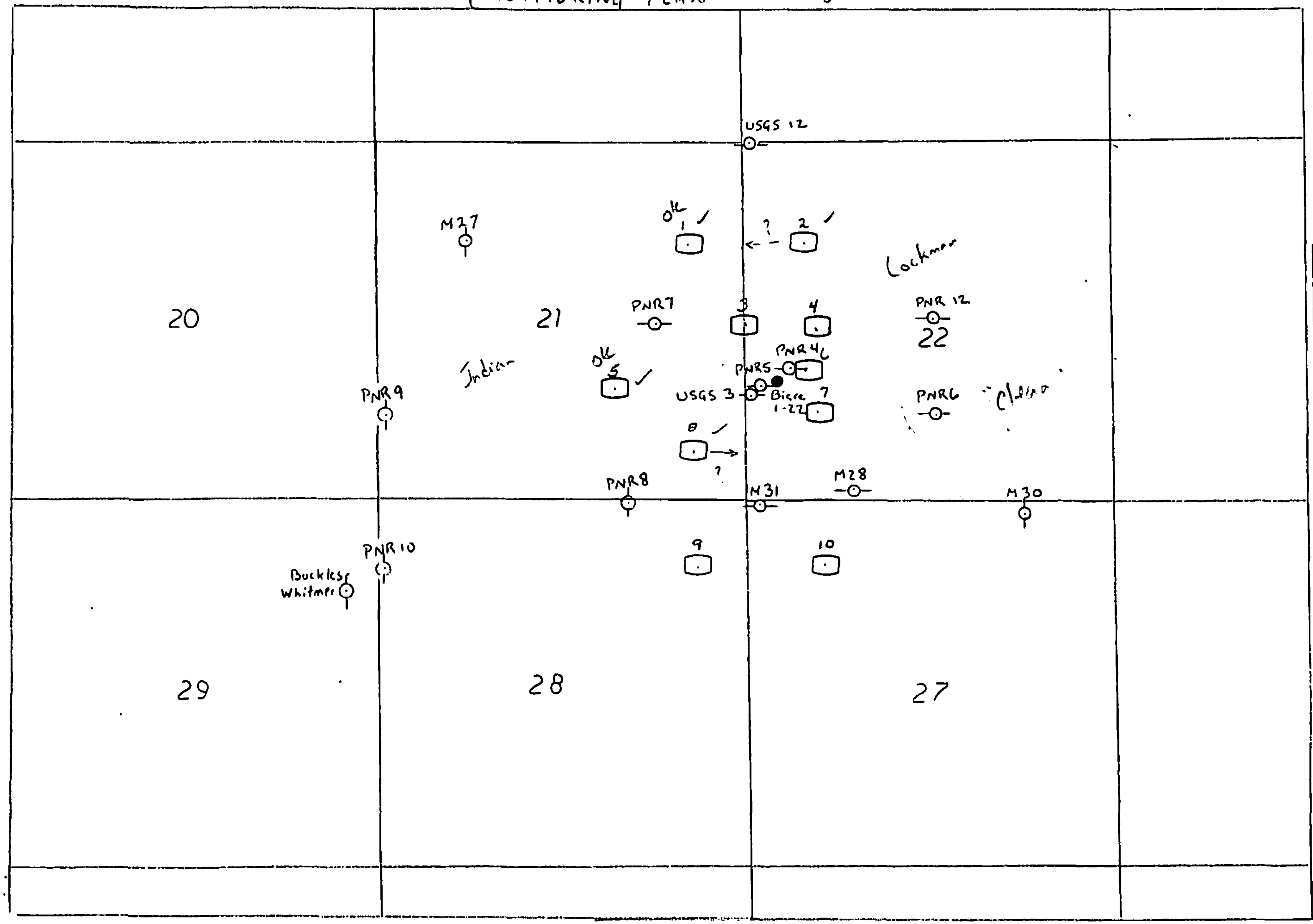
cc: Wilbur Dover, Operation Services Manager
Pioneer Natural Resources USA, Inc.
1400 Williams Square West
5202 North O'Connor Blvd.
Irving, Texas 75039-3746

Deb Madison, Environmental Program Manager
Assiniboine & Sioux Tribes
P.O. Box 1027
Poplar, Montana 59255

PIONEER NATURAL RESOURCES
BIERE 1-22 REMEDIATION
MONITORING PLAN

dated Jan. 30, 2001

No.



Sample Parameters

Temperature
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TDS
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← 1 mile →

By N. Wiser 3-1-2001

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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DENVER, CO 80202-2466
http://www.epa.gov/region08

CONCURRENCE COPY

Ref: 8ENF-T

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Steven Leifer
Baker Botts L.L.P.
The Warner
1299 Pennsylvania Avenue, NW
Washington, D.C. 20004-2400

Re: Comments on January 30, 2001 Proposed
Monitoring Plan for the Shallow Groundwater
Pioneer Natural Resources USA, Inc.
Biere 1-22 Production Well
East Poplar Oil Field
Roosevelt County, Montana

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8ENF-T NW 3-27-01   ENF-L JHE 3/27/01   SEC SPM 3/28/01   Concurs w/ comments 3/28/01

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would? that?

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Enclosure

cc: Deb Madison, Environmental Program Manager
Assiniboine & Sioux Tribes
P.O. Box 1027
Poplar, Montana 59255

Jim Boyter, 8MO

+ the company?

bcc who? (on separate page)

bcc: Steven Moores, 8RC
Jim Eppers, 8LEP
Mike Gansecki, 8P-HW
Randall Breeden, 8P-HW
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Connally E. Mears, Director
Technical Enforcement Program

Enclosure

cc: Wilbur Dover, Operation Services Manager
Pioneer Natural Resources USA, Inc.
1400 Williams Square West
5202 North O'Connor Blvd.
Irving, Texas 75039-3746

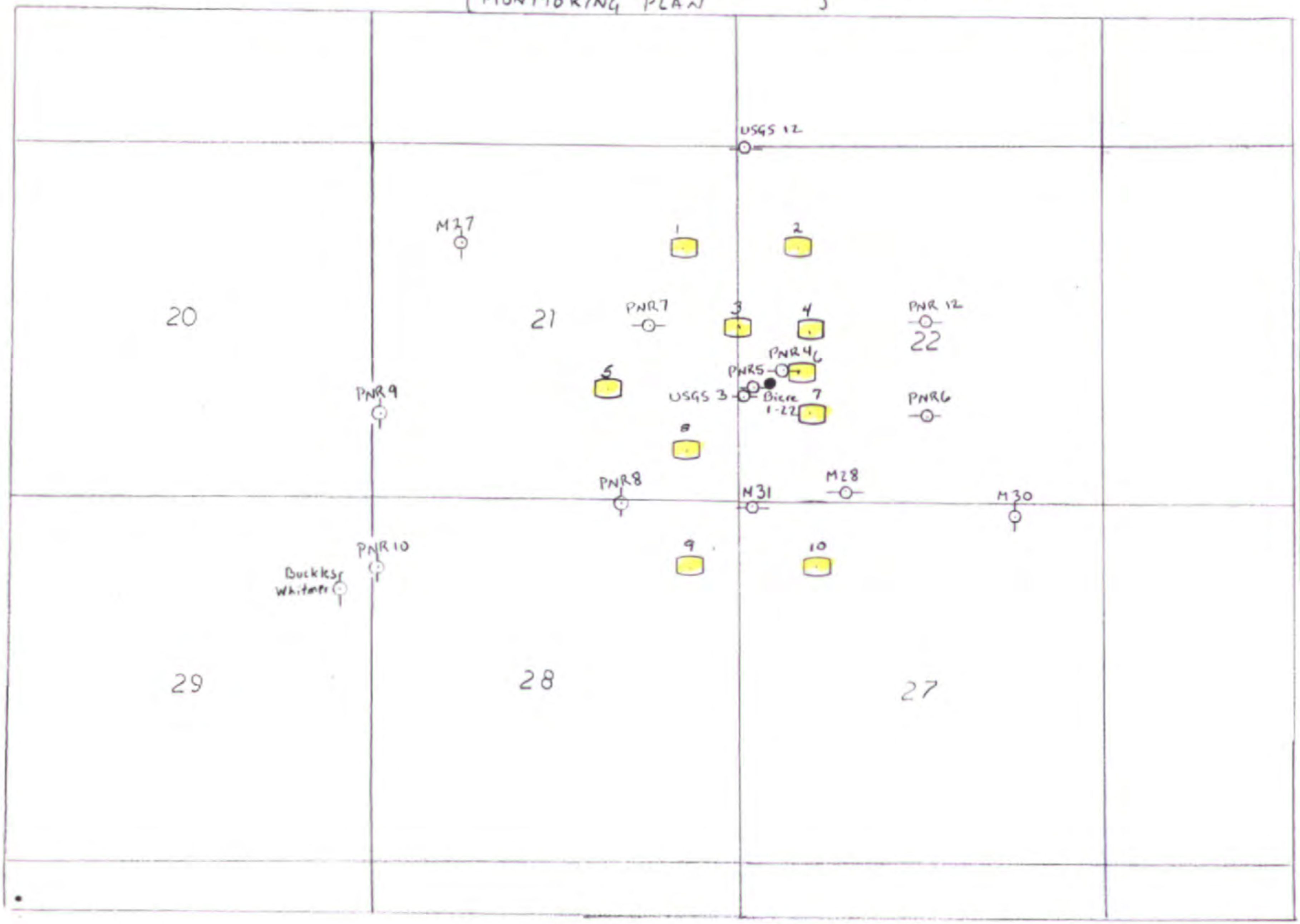
Deb Madison, Environmental Program Manager
Assiniboine & Sioux Tribes
P.O. Box 1027
Poplar, Montana 59255

bcc: Steven Moores, 8RC
Jim Eppers, 8LEP
Mike Gansecki, 8P-HW
Randall Breeden, 8P-HW
Jim Boyter, 8MO

Pioneer Natural Resources
Biere 1-22 Remediation
Monitoring Plan

dated Jan. 30, 2001

No. ↑



Sample Parameters

Temperature
pH
Specific Conduct.
TDS
Na
Cl
TPH
BTEX

← 1 mile →

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(9) -o- = Monitoring (0-100') Well 3-mo Sample
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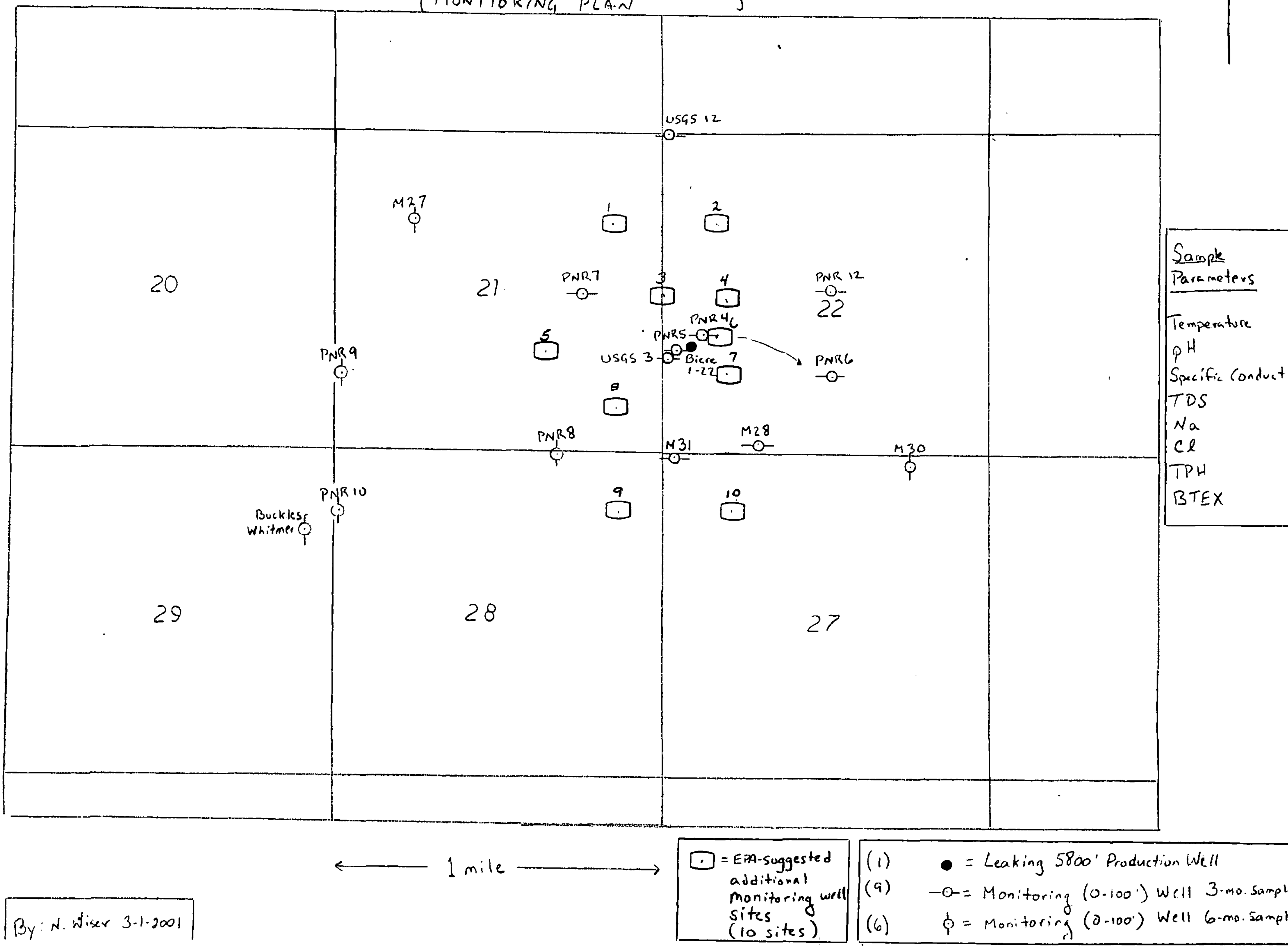
By N. Wiser 3-1-2001

PIONEER NATURAL RESOURCES
BIERE 1-22 REMEDIATION
MONITORING PLAN

dated Jan. 30, 2001

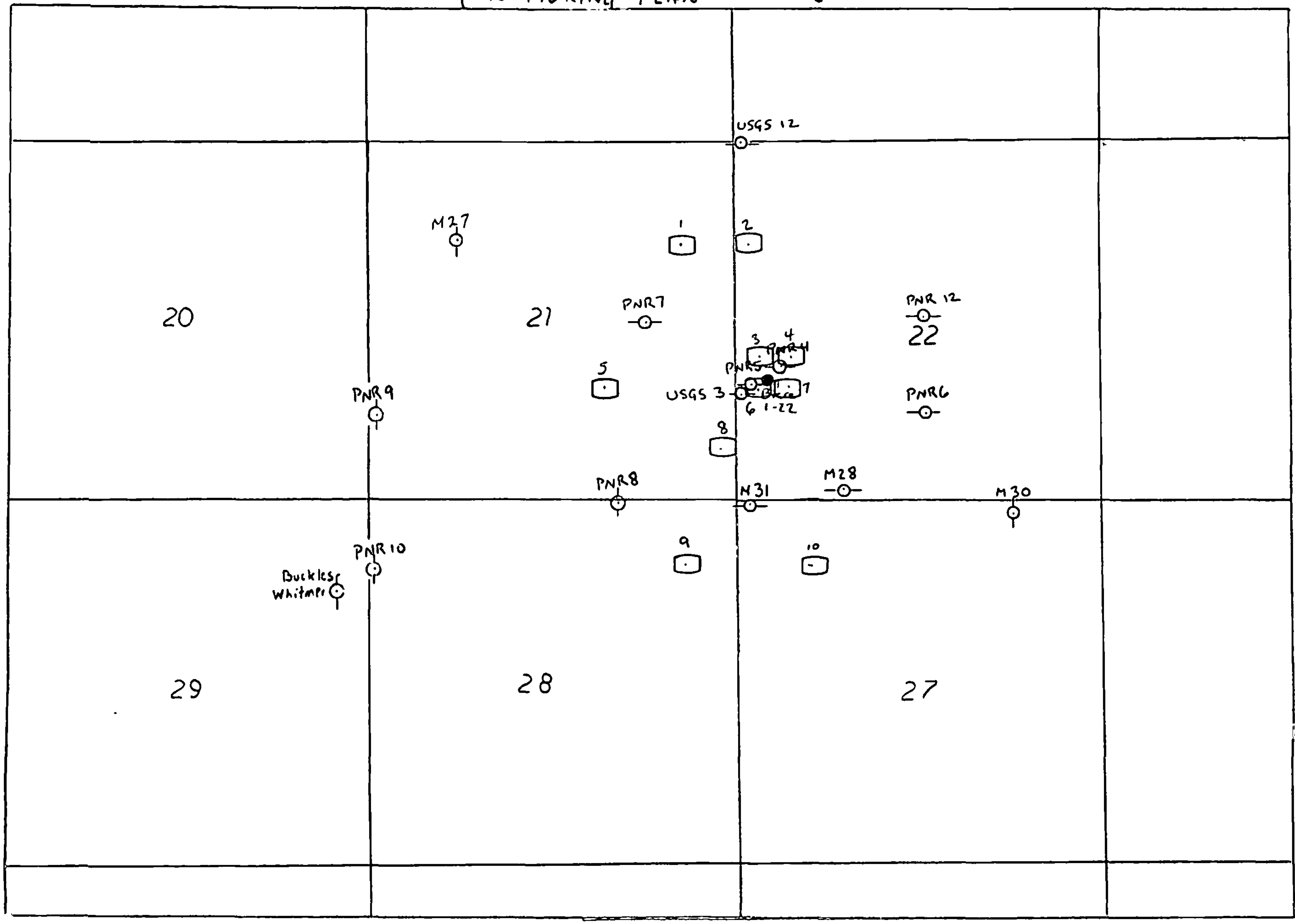


EPA Suggestion
3-28-01

PIONEER NATURAL RESOURCES
BIERE 1-22 REMEDIATION
MONITORING PLAN

dated Jan. 30, 2001

No.



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EPA Compromite

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Apr. 13, 2001

Ref: 8ENF-T

APR 13 2001

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Steven Leifer
Baker Botts L.L.P.
The Warner
1299 Pennsylvania Avenue, NW
Washington, D.C. 20004-2400

Re: Proposed Emergency Administrative Order upon Consent
Pioneer Natural Resources USA, Inc.
Biere 1-22 Production Well
East Poplar Oil Field
Roosevelt County, Montana

Dear Mr. Leifer:

The United States Environmental Protection Agency ("EPA") would like to engage you and your client, Pioneer Natural Resources USA, Inc. ("Pioneer") in discussion regarding an emergency enforcement order under Section 1431 of the Safe Drinking Water Act covering the remediation of the Biere 1-22 former oil production well in the East Poplar Oil Field, located in northeastern Montana, on the Fort Peck Indian Reservation. As you know, EPA and Pioneer have been discussing the most practical and permanent means to address this well, which continues to contaminate the surficial Quaternary deposits aquifer in the vicinity of Section 22, Township 28 North, Range 51 East. These discussions include a recent meeting, held at the Denver EPA Regional office on February 16, 2001, several pieces of correspondence between EPA and Pioneer, as well as telephone conversations between EPA and Pioneer.

As you expressed during your February 16, 2001 visit to the Denver EPA Regional office, Pioneer would prefer to not be the subject of another unilateral enforcement order. Rather, you voiced a preference for an order reached on consent. In the interest of preserving our good working relationship, I am offering a 30-day period to reach consensus on such an enforcement order. The 30 days will begin upon your receipt of this letter. If 30 days have passed and no written agreement has been reached between EPA and Pioneer with regard to the terms of the enforcement order, then EPA will consider any additional rights and options it has, including issuing a unilateral emergency order under Section 1431 of the Safe Drinking Water Act to Pioneer.

Accordingly, please find enclosed a proposed "Emergency Administrative Order upon Consent" related to the Biere 1-22 former oil production well. This enclosed order asserts an enforceable time frame during which Pioneer must finalize its plan to remediate the Biere 1-22 well, implement the plan, finalize its plan to monitor the Biere 1-22 well remediation, and implement the monitoring plan. It is our strong desire that EPA and Pioneer can reach agreement on this matter within 30 days of your receipt of this letter.

Being cognizant of the 30-day limitation, please either sign this enclosed Order or offer constructive ideas for its slight modification. If you sign this transmitted Order, then please return the signed version and EPA will, in turn, sign the Order and file it with the Regional Hearing Clerk. If you have any questions about this matter, please feel free to contact Jim Eppers, Enforcement Attorney, at (303) 312-6893. Questions concerning of a technical nature may be directed to Nathan Wiser of my staff at (303) 312-6211.

Sincerely,

Connally E. Mears

Connally E. Mears, Director
Technical Enforcement Program

Enclosure

cc: Deb Madison, Environmental Program Manager
Assiniboine & Sioux Tribes
P.O. Box 1027
Poplar, Montana 59255

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII

IN THE MATTER OF Pioneer Natural Resources USA Incorporated, Respondent East Poplar Oil Field Fort Peck Indian Reservation Montana Proceedings under Section 1431(a) of the Safe Drinking Water Act, 42 U.S.C. §300g-i(a)	Docket No. **EMERGENCY ADMINISTRATIVE ORDER UPON CONSENT ("EAOC")**

DESCRIPTION

1. This Emergency Administrative Order upon Consent ("EAOC") is entered into between the United States Environmental Protection Agency, Region 8 ("EPA") and Pioneer Natural Resources USA, Inc. ("Pioneer") (collectively, "the Parties") and concerns contamination of an underground source of drinking water ("USDW") caused by an oil well (known as the Biere 1-22 well), located in the East Poplar Oil Field, on the Fort Peck Indian Reservation in northeastern Montana. EPA issued an Emergency Administrative Order ("EAO") (Docket #SDWA-8-99-68) which applies more broadly to this same oil field and contains different

requirements, and continues in effect in addition to this EAOC. The existing EAO, Docket #SDWA-8-99-68, was issued September 30, 1999, first amended on November 5, 1999, and second amended on November 30, 2000. The findings described in Section IV of this EAOC relate to the East Poplar Oil Field generally. The findings described in Section V are specific to the more limited area in and around the Biere 1-22 well.

I. STATUTORY AUTHORITY

2. The following Findings are made and Order issued under the authority vested in the Administrator of the U.S. Environmental Protection Agency (EPA) by Section 1431(a) of the Safe Drinking Water Act (the Act), 42 U.S.C. §300i(a). The authority to take this action has been properly delegated to the undersigned EPA program supervisors.

II. ENFORCEMENT RESPONSIBILITY

3. This matter takes place on lands within the exterior boundary of the Fort Peck Indian Reservation in Roosevelt County in the State of Montana.

III. DESCRIPTION OF RESPONDENTS

4. Pioneer Natural Resources USA, Inc. ("Pioneer" or "Respondent") is a Delaware corporation and therefore a

"person" within the meaning of Title 40 of the Code of Federal Regulations (40 CFR) §141.2 and §144.2 and Section 1401(12) of the Act, 42 U.S.C. §300f(12). In its merger with Mesa Petroleum Company, Pioneer Natural Resources USA, Inc. acquired Mesa's assets, a company which did business in the State of Montana.

5. Respondent previously owned and presently owns oil and gas production facilities, including but not limited to oil or gas production well(s) (including, but not limited to the Biere 1-22 well), produced brine disposal well(s), production and waste pit(s), storage tank(s), oil/water separator(s), and distribution pipelines and pumping facilities, in portions of the East Poplar Oil Field located within Township 28 North, Range 51 East on the Fort Peck Indian Reservation in Roosevelt County in the State of Montana.

IV. FINDINGS - EAST POPLAR OIL FIELD

6. The uppermost geologic deposits found in the East Poplar Oil Field are Quaternary-aged (less than about 2 millions years old). These Quaternary-aged deposits, herein after referred to as "Quaternary deposits," are sufficiently permeable and contain uncontaminated groundwater in sufficient quantities to be considered an aquifer. Uncontaminated groundwater, taken from private water wells and groundwater monitoring wells in

the area, contains total dissolved solids content ranging between 427 and 2680 milligrams per liter (mg/L). The Quaternary deposits in the East Poplar Oil Field consist primarily of the Winota Gravel, Sprole Silt, glacial till, fan alluvium and colluvium, and alluvium. Lithologic logs from monitoring wells drilled in the area show thicknesses of the Quaternary deposits ranging between about 30 and 140 feet. Groundwater in the Quaternary deposits east of the Poplar River generally moves westward toward the river where it merges with southward-flowing ground water in the Poplar River valley. Water in the Quaternary deposits of the East Poplar Oil Field is recharged by infiltration of precipitation, and movement of water from up-gradient areas. Groundwater flow in the Quaternary deposits has a horizontal component because its downward movement is bounded by the underlying, relatively impermeable Bearpaw Shale, and is forced to move laterally. Depth to the water table below land surface in this area generally ranges from about 5 to 139 feet in the Quaternary deposits.

7. The Quaternary deposits form an unconfined aquifer which contains a sufficient quantity of ground water to supply a public water system. A public water system ("PWS"), as defined at 40 CFR § 141.2, means a system for the provision to the public of piped water for

human consumption, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year.

8. The Quaternary deposits forming an aquifer are the sole developed source of water for private resident wells in and around the East Poplar Oil Field. In addition, the Poplar, Montana, tribally-owned Poplar Head Start Center public water supply system and the City of Poplar public water supply system derive water from the Quaternary deposits.

9. The Quaternary deposits are a USDW. A USDW, as defined under 40 CFR § 144.3, means an aquifer or its portion which supplies any PWS or which contains a sufficient quantity of ground water to supply a public water system; and currently supplies drinking water for human consumption or contains fewer than 10,000 mg/L total dissolved solids.

10. The United States Geological Survey ("USGS") has conducted an extensive ground water investigation of saline-water contamination in and around the East Poplar Oil Field. The USGS reviewed ground water and surface water quality data from existing private water wells, new monitoring wells, oil wells, brine-injection wells, and the Poplar River in the East Poplar Oil Field area. Additionally, the USGS completed an

electromagnetic geophysical survey, by measuring the electromagnetic apparent conductivity corrected for local anomalies (wells, pipelines, etc.), over a 21.6 square mile area to assist in the delineating the extent of the saline-water contamination plumes. Ground water in the area determined by the USGS to be contaminated contained total dissolved solid levels as high as 91,100 mg/L.

11. Between January 1999 and September 2000, EPA collected water samples at 21 home sites with private water wells in the contamination area to determine if contamination by oil field brine, and associated hydrocarbon by-products, or other organic chemical compounds was a concern. EPA also took water samples from the three wells that supply the City of Poplar's public drinking water, located in the City of Poplar, approximately 3 miles from what appears to be the leading edge of the contaminant plume, and from one water well supplying water to the Fort Peck Indian Government offices also located in the City of Poplar. EPA found TDS levels at the 21 home sites to range between 433 and 17,000 mg/L. EPA found a total of 81 detections of 10 different organic chemical compounds ranging between 0.00028 and 193.0 mg/L. A summary of all of EPA's sample results is attached to this EAOC as Attachment 1.

12. Brine samples taken by EPA from injection well

locations in September, 2000 in the East Poplar Oilfield prior to their injection showed several remnants of hydrocarbons. These results are displayed in the following table.

INJECTATE SAMPLES

Sample date	Constituent detected	Concentration range (mg/l)
9/29/00	Total Dissolved Solids	85,900 to 120,000
9/29/00	Benzene	1.67 to 1.76
9/29/00	Ethylbenzene	0.115 to 0.181
9/29/00	Toluene	1.53 to 1.86
9/29/00	Xylenes (total)	0.146 to 0.546
9/29/00	Total Extractable Hydrocarbons	39.0 to 67.0
9/29/00	Diesel Range Organics	28.0 to 51.0
9/29/00	Naphthalene	0.023 to 0.036
9/29/00	Isopropylbenzene	0.0066 to 0.011
9/29/00	n-Propylbenzene	0.012 to 0.019
9/29/00	1,2,4-Trimethylbenzene	0.056 to 0.087
9/29/00	1,3,5-Trimethylbenzene	0.019 to 0.028
9/29/00	bis(2-ethylhexyl)phthalate	0.049 to 0.053

13. Samples taken by both EPA at the existing home sites and USGS at several monitoring wells showed benzene contamination. A sample taken at one home site had benzene contamination between 0.058 and 0.078 mg/L, while other samples taken at USGS monitoring wells in the field were between 0.00158 and 0.00486 mg/L.

14. Under the Primary Drinking Water Standards, the maximum

contaminant level ("MCL") for benzene, as set forth in 40 CFR §141.61, is 0.005 mg/L. Under the Secondary Drinking Water Standards, as set out in 40 CFR §143.3, the standard for total dissolved solids is 500 mg/L.

15. Benzene is a known human carcinogen. A causal relationship between benzene exposure and leukemia has been clearly established. EPA, in its consensus position on toxicological effects, the Integrated Risk Information System ("IRIS"), uses human occupational data to estimate the added risk of contracting cancer from exposure to benzene. Epidemiologic studies and case studies provide clear evidence of a causal association between exposure to benzene and acute nonlymphocytic leukemia and also suggest evidence for chronic nonlymphocytic leukemia and chronic lymphocytic leukemia. Other neoplastic conditions that are associated with an increased risk in humans are hematologic neoplasms, blood disorders such as preleukemia and aplastic anemia, Hodgkin's lymphoma, and myelodysplastic syndrome. These human data are supported by animal studies. The experimental animal data add to the argument that exposure to benzene increases the risk of cancer in multiple species at multiple organ sites (hematopoietic, oral and nasal, liver, forestomach, preputial gland, lung, ovary, and mammary gland). According to IRIS, dated January 2000,

EPA estimates that consumption of drinking water containing 0.078 mg/L benzene is associated with an added risk of cancer of between 1 in 10,000 people and 1 in 100,000 people.

16. The presence and entry of benzene at levels as high as 0.078 mg/L in the Quaternary deposits USDW presents an imminent and substantial endangerment to the health of persons.

17. Total dissolved solids in excess of 1,000 to 2,000 mg/L is unpalatable and will not be voluntarily consumed by individuals. If an individual has no other source of water and is forced to consume water with TDS levels over 10,000 mg/L, the adverse health effects include severe osmotic diarrhea and severe dehydration. Continued consumption after the onset of the above conditions may result in death.

18. The presence and entry of total dissolved solids at levels between 10,000 and 91,100 mg/L where found in the Quaternary deposits USDW presents an imminent and substantial endangerment to the health of persons.

V. FINDINGS - NEAR BIERE 1-22 WELL

19. The Biere 1-22 production well is located at Township 28 North, Range 51 East, Section 22, 1980 feet from the south line, 660 feet from the west line. This well was originally drilled by Mesa Petroleum Company, of

Amarillo, Texas and was completed on June 8, 1970. The Biere 1-22 production well was operated by various operators, including at least Mesa Petroleum Company, Mr. John Snyder, and AMARCO Resource Corporation, until it was plugged on September 17, 1984 by Mesa Petroleum Company.

20. Within nine months of plugging the Biere 1-22 production well, the cement used for plugging failed and fluid flowed to the surface at the Biere 1-22 wellhead.

21. Between July 12, 1985 and July 29, 1985, a "relief" well was drilled, operated and plugged. The "relief" well was located 25 feet north-northeast of the Biere 1-22 production well and was used to inject additional cement into the formation in an attempt to stop water observed to be flowing to the surface at the Biere 1-22 well, described in paragraph 20 above. This action appears to have been successful in stopping the flowing water over a period of time of between 8 and 12 years.

22. Between May 1, 2000 and May 12, 2000, Respondent installed eight monitoring wells in the general vicinity of the Biere 1-22 production well. The monitoring wells were completed at depths ranging from approximately 35 feet to approximately 95 feet below ground surface. During May-June 2000, Respondent sampled two existing monitoring wells in the vicinity

and four existing domestic water wells in the vicinity, as well as the eight new monitoring wells installed by Respondent.

23. All samples collected during May-June 2000 were analyzed for the same parameters, water temperature, water level and water chemistry.

24. Sampling revealed the 59.5-foot deep PNR-4 monitoring well, located near the Biere 1-22 well, contained more than 40 feet of "free" oil floating on top of the ground water.

25. Between May 31 and June 1, 2000, a sample of "free" oil was taken from the PNR-4 monitoring well. Benzene was detected at a concentration of 330 mg/L. Toluene was detected at a concentration of 1,270 mg/L. Ethylbenzene was detected at a concentration of 1,950 mg/l. Total xylenes was detected at a concentration of 3,190 mg/l.

26. The MCL for total xylenes is 10.0 mg/L, the MCL for ethylbenzene is 0.7 mg/L, and the MCL for toluene is 1.0 mg/L.

27. Ethylbenzene is toxic to the liver and kidney in laboratory studies using rats. A concentration of 291 milligrams of ethylbenzene per kilogram body weight in rats is considered to be the lowest concentration at which an adverse effect is noticeable in a statistically significant population. This is

equivalent to a 70 kilogram human drinking water containing 10.2 mg/L of ethylbenzene, and includes an uncertainty factor of 1000 for the extrapolation from rats to humans.

28. Toluene causes changes in weight of the liver and kidney in laboratory studies using rats. A concentration of 446 milligrams of toluene per kilogram body weight in rats is considered to be the lowest concentration at which an adverse effect is noticeable in a statistically significant population. This is equivalent to a 70 kilogram human drinking water containing 15.6 mg/L of toluene, and includes an uncertainty factor of 1000 for the extrapolation from rats to humans.

29. Total xylenes is associated with low body weight, hyperactivity and mortality to males in laboratory studies using rats. A concentration of 357 milligrams of total xylenes per kilogram body weight in rats is considered to be the concentration that produces an irreversible adverse effect with a statistically significant increase in frequency between those exposed and those not exposed. This is equivalent to a 70 kilogram human drinking water containing 125 mg/L of ethylbenzene, and includes an uncertainty factor of 100 for the extrapolation from rats to humans.

30. Benzene was detected in ground water taken from five

monitoring wells, located northwest, south and southeast and all within approximately 2000 feet of the Biere 1-22 well, at concentrations of 0.0012, 0.027, 0.0044, 0.014, and 0.041 mg/l.

31. The temperature measured in the Quaternary aquifer at the 15 different monitoring wells near the Biere 1-22 well ranged from 9.4°C (48.9°F) to 60.0°C (140.0°F). The undisturbed temperature in the Quaternary aquifer is near 10°C (50°F). Elevated temperatures exist in deeper geologic strata, with temperature increasing as depth increases, typically at rates between 1°F and 3°F per 100 feet of depth. The presence of groundwater in the Quaternary aquifer as hot as 140.0°F indicates a source between 3000 and 9000 feet below ground surface.

32. Groundwater level measured at 12 different monitoring wells near the Biere 1-22 well ranged from 1957.76 feet above sea level to 2098.75 feet above sea level. The more elevated levels were found nearest the Biere 1-22 well, suggesting a dome-like upper surface of the groundwater surrounding Biere 1-22 well.

33. Results from Respondent's May-June 2000 sampling indicate that the Biere 1-22 production well is an on-going source of ground water contamination. The plume of brine and hydrocarbon contaminants appears to emanate from a deep source along the Biere 1-22 production well, locally causing a doming effect in the

Quaternary aquifer centered on the Biere 1-22 well such that contaminants move away from the Biere 1-22 well in a generally radial direction, with a slightly dominant direction toward the west, merging with the more regional southwest direction of groundwater flow in the East Poplar Oil Field, toward the City of Poplar.

34. Contaminants from the Biere 1-22 well, including "free" oil, total dissolved solids, and benzene, are present in, entering, and are likely to continue to enter the Quaternary deposits.

35. Based upon the data obtained regarding the geology in the affected area, the general direction of groundwater migration in the USDW, water quality assessments from monitoring and private wells, and review of historical land use in the area, EPA has determined that Respondent's oil production practices at the Biere 1-22 well and/or equipment at the Biere 1-22 well have caused or contributed and/or are continuing to cause or contribute to the endangerment of a USDW. Some contaminants exceed their MCL. These and the presence of other contaminants indicate that Respondent's Biere 1-22 well continues to contaminate the only drinking water aquifer available in the vicinity of the Biere 1-22 well with hydrocarbon by-products entrained in hot brine.

36. EPA has consulted with local authorities, the

Assiniboine and Sioux Tribes of the Fort Peck Reservation, prior to issuing this Order. The Tribes have not taken an action to address the Biere 1-22 well and support this EAOC action.

37. The State of Montana has been consulted by EPA. The State has not taken an action to address the Biere 1-22 well.

38. EPA, therefore, finds that the actions ordered below are authorized under Section 1431 of the Act, 42 U.S.C. §300(i), and are necessary in order to protect the health of persons.

VI. PURPOSE

39. The purpose of this Emergency Administrative Order upon Consent is to require an action which EPA believes is necessary to remove the imminent and substantial endangerment to the health of persons located within the areas described in this Emergency Administrative Order upon Consent.

VII. ADMINISTRATIVE ORDER

40. Based on the foregoing findings, taking into account the imminent and substantial endangerment to the health of persons and other such matters as justice may require, as shown by the administrative record, and under authority of §1431(i) of the Act, 42 U.S.C.

to stop the Biere 1-22 well from contaminating the Quat. aquifer, and

§300(i), Respondent is ordered to perform the following actions:

PREPARE AND SUBMIT BIERE 1-22 PRODUCTION WELL REMEDIATION ACTION PLAN

The Respondent shall prepare and submit a plan for EPA approval to address the on-going contamination of the Quaternary aquifer at the Biere 1-22 production well location. Implementation of the plan shall occur within 30 days of EPA's final approval of the plan. Such plan shall contain, at a minimum, the following elements:

A. A Well Containment Plan

Respondent shall develop a plan to plug or encapsulate the Biere 1-22 well in a manner that precludes any further contamination by the Biere 1-22 well into the Quaternary aquifer or other potential underground drinking water sources. This Well Containment Plan shall ensure that the Biere 1-22 wellbore is sealed to preclude vertical water movement in the wellbore or alongside the wellbore from a depth at least as deep as the top of the Judith River formation (at approximately 688 feet depth below ground surface). The Well Containment Plan shall stop existing contaminants entering the

Quaternary deposits and shall not introduce new contaminants into the Quaternary deposits. ~~The~~ Implementation of the Well Containment Plan shall ~~be~~ stop ~~a permanent solution addressing~~ the leaking Biere 1-22 well. In the event the Plan submitted by the Respondent under this Order includes underground injection regulated under the Safe Drinking Water Act, Respondent will submit to EPA a complete application for any required permit, following procedures and standards under the federal underground injection control regulations.

B. A Monitoring Plan

Respondent shall develop a plan to monitor the Quaternary aquifer or other potential underground drinking water sources in the vicinity of the Biere 1-22 well to ensure that the Well Containment Plan ends any on-going contamination from the Biere 1-22 well. The Monitoring Plan shall contain, at a minimum, the following elements:

1. Quarterly groundwater samples, to include, at a minimum initially: pH, sodium, total dissolved solids, chloride, benzene, toluene, ethylbenzene, total xylenes, total

petroleum hydrocarbons, calcium, potassium, magnesium, bicarbonate, carbonate, and sulfate. Additional chemical analytes may need to be added or deleted depending upon the nature of the Well Containment Plan;

2. Quarterly groundwater temperature measurements initially;
3. Quarterly groundwater piezometric (water level) measurements initially;
4. Criteria for determining that the Well Containment Plan, submitted pursuant to Paragraph 40(A) of this EAOC, was successfully implemented;
5. The threshold values for these criteria must be enumerated or defined in order to objectively determine that the Biere 1-22 well was successfully and permanently contained, including values showing that the temperature, water level, and water chemistry have returned to their pre-contaminant values; and
6. The projected duration of monitoring, including the criteria for any addition or reduction in both frequency and location of monitoring.

C. Reporting Schedule

Respondent shall quarterly report on any activities undertaken required under Paragraphs 40(A) and (B) above. Quarterly reports shall be submitted to the addresses described in Paragraph 40(E)(3) below.

D. Quality Assurance and Quality Control

Respondent shall, for each deliverable described in Paragraphs 40(A)-(C) of this Emergency Administrative Order upon Consent, include quality assurances and quality controls. These quality assurances and quality controls shall, at a minimum, address the following:

1. Accuracy of measurement of parameters;
2. Precision of measurement of parameters;
3. Repeatability of measurement of parameters;
4. Sampling protocols;
5. Measurement protocols;
6. Laboratory chosen for analyses; and
7. Groundwater measurement techniques.

E. Reporting Requirements

1. Respondent shall quarterly report on progress made on all efforts under Paragraph 40 of this Emergency

Administrative Order upon Consent.

2. All reports submitted shall include the following certification statement:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations."

3. Reports shall be submitted to the following addressees:

United States Environmental Protection Agency, Region 8
Office of Enforcement, Compliance and Environmental Justice,
Technical Enforcement Program
999 18th Street, Suite 300
Denver, Colorado 80202
Attention: Nathan Wiser (8ENF-T)
Telephone: (303) 312-6211

Assiniboine and Sioux Tribes
P.O. Box 1027
Poplar, Montana 59255
Attention: Deb Madison
Telephone: (406) 768-5155 ext.399

F. Due Dates for Plan Deliverables in this Emergency Administrative Order upon Consent

1. Respondent shall comply with the

following timetable to submit and implement the two Plans required in Paragraphs 40(A) and (B) of this EAOC:

Paragraph of Order	**Description of Requirement**	**Submission Deadline**	**Implementation Deadline**
40(A)	Biere 1-22 Well Containment Plan	15 days from effective date of this Order	30 days from EPA approval of Plan
40(B)	Biere 1-22 Well Monitoring Plan	15 days from effective date of this Order	30 days from EPA approval of Plan

2. Once approved by the EPA, these Plans shall automatically become enforceable under the provisions of this EAOC.

VIII. GENERAL PROVISIONS

41. The provisions of this EAOC shall apply to and be binding upon Respondent, its officers, directors, agents, successors and assigns. Notice of this EAOC shall be given to any successors in interest prior to transfer of any of the oil and gas facilities or its operation. Action or inaction of any persons, firms, contractors, employees, agents, or corporations acting under, through or for Respondent, shall not excuse any failure of Respondent to fully perform its obligations under this EAOC.

legally bind the Party to the terms and conditions of this EAOC.

50. The Parties agree to bear their own costs and attorneys fees in connection with this matter.

51. This EAOC contains all terms of agreement by the Parties regarding the Biere 1-22 well.

52. The effective date of this Emergency Administrative Order upon Consent shall be the date Respondent receives a fully signed version of this Order.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION 8

Date:__________________ By: ___________________________

David J. Janik
Supervisory Enforcement Attorney
Legal Enforcement Program
Office of Enforcement, Compliance and Environmental Justice

Date:__________________ By: ___________________________

Connally E. Mears, Director
Technical Enforcement Program
Office of Enforcement, Compliance and Environmental Justice

PIONEER NATURAL RESOURCES USA, INC.

Date: ________________ By: ____________________________

Title: ________________________

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May 1, 2001

VIA OVERNIGHT MAIL

Mr. Connally E. Mears, Director
Technical Enforcement Program (8ENF-T)
Office of Enforcement, Compliance, and Environmental Justice
U.S. Environmental Protection Agency
999 18th Street, Suite 300
Denver, CO 80202-2466

Re: Biere Well Site, East Poplar Oil Field: Response to EPA Comments on Proposed Monitoring Plan

Dear Mr. Mears:

Thank you for your March 28 comments on Pioneer's Proposed Monitoring Plan for the Shallow Groundwater. We agree with most of your comments and will make changes accordingly. With respect to a couple of your comments, we want to discuss further the best approach to pursue in view of technical feasibility and cost-effectiveness considerations. Pioneer's detailed responses to EPA's comments are set forth below.

Additional Monitoring Well Locations

Installation of Additional Wells

Pioneer agrees additional wells in the vicinity of the Biere well would assist in monitoring the effectiveness of the response action effort. Pioneer is negotiating a land agreement with the owner to allow unrestricted use of a drill pad site covering approximately 2 acres centered on the Biere well. Pioneer proposes to install 4 new wells at the perimeter of the 2 acre work area; one on each of the four sides (north, south, east and west). These wells will be installed shortly after implementation of the response action program, since the amount of equipment and intensity of effort required by the program would create an unacceptable risk of damage to any wells within the immediate area of the Biere well.

Replacement of PNR4

Pioneer believes that well PNR4 does not require replacement at this time. Well PNR4 was stoutly constructed and will be a valuable monitoring point to assess changes in the shallow Quaternary Aquifer following the response action program. Well PNR4 is within approximately 25 feet of the Biere well and guarding it from physical damage during the response action effort will be difficult. The well may have to be temporarily abandoned to protect it and the shallow aquifer prior to beginning the response action activities.

Several options, ranging from monitoring methods to retro-fitting the existing well with discrete monitoring tube(s) to allow easier measurement of down-hole temperature, conductivity and water level (total head) in the presence of accumulated floating petroleum, are being considered and will be implemented prior to the Biere well response action program to allow collection of at least some baseline data. After the response program, if the well was destroyed, or if a satisfactory monitoring method or retro-fit cannot be accomplished, Pioneer will replace the well.

Spatial Gaps Between Wells

On the figure attached to the May 28 comments, EPA has shown 4 locations for wells addressing the issue of spatial gaps (wells 1, 2, 5 and 8). Please note that there are significant problems in gaining access to the locations indicated on the figure. For example, a well at the approximate location of EPA's well 5 was proposed during the initial installation of monitoring wells, but could not be installed due to a delay in access approval from the Fort Peck Tribal Council. Nevertheless, Pioneer will continue its attempts to obtain an access agreement and will install a well at this location upon securing appropriate access. Similarly, if access can be obtained, Pioneer will install another well at the location indicated by well 1 on EPA's figure in order to help define the northwest side of the plume.

Pioneer does not consider EPA's well numbers 2 and 8 as either practical to install due to land use restrictions nor necessary for the purposes of this monitoring plan. Both of these well locations proposed by EPA are in the middle of cultivated fields and, therefore, obtaining property owner access is problematic. With a few exceptions, potential drill sites are limited to section lines or 1/2 section lines and county road right of ways. County road right of way setbacks and powerline separation requirements further limit the available drilling locations. In addition, well 2 is not necessary because existing well USGS FPB92-12 and potential new well (EPA 1) should adequately address the north side of the plume. Well 8 is not necessary because existing well PNR 8, Trottier M31, and potential new wells at EPA 5 and EPA 9 (if it can be installed) should provide adequate definition of the impacted groundwater in this area. Once the new wells are installed, Pioneer and EPA will be in a more informed position to determine if additional wells are necessary to accomplish the goals of the monitoring plan.

Well Sites Near Trottier and Lockman

Pioneer agrees that installing additional wells to the south of the existing Trottier and Lockman wells would help identify whether there are other potential sources of contaminants and allow better definition of groundwater potentially impacted by the Biere well. Pioneer will pursue access agreements for two wells in this general area. The exact locations and installation schedules for these wells will be dictated by land use restrictions and landowner requirements. Furthermore, Pioneer intends to continue employing the unused domestic wells at Lockman and Trottier as key monitoring points, given their strategic location and the historical database that has been developed for these wells. Pioneer will pursue obtaining long-term access agreements and make minor wellhead modifications to facilitate incorporating these wells into the monitoring network.

Nested Wells

Pioneer believes that nested well pairs are not necessary. The permeable Quaternary gravel deposits above the Bear Paw Shale range from less than 5 feet to about 15 feet thick over most of the study area, with the single exception of well PNR10 approximately 1 1/2 miles southwest of the Biere well. Well PNR 10 appears to be positioned at the edge of the alluvial aquifer associated with the Poplar River drainage and the gravel at this location is at least 30 feet thick. At PNR4 near the Biere well, the gravel is only 7 feet thick and at PNR7 west of the Biere well the gravel is only 5 feet thick. Pioneer does not believe the thickness of the Quaternary Aquifer is sufficient to justify well pairs or triplets. In addition, dispersion and diffusion within the aquifer appears to rapidly mix the sodium chloride brine signature throughout the entire vertical profile of the permeable sediments, as evidenced by the USGS well pair FPB93-3 and FPB93-3a.

Nor does Pioneer believe that the potential for vertical stratification of contaminants in the context of a high density liquid (brine) infiltrating from the surface requires additional nested well pairs. The predominant mechanism/pathway allowing the brines to impact the shallow aquifer at the Biere well is believed to be upward communication from the deeper formations. Consequently the dense brines are entering the bottom of the aquifer, not at the top. The thick overlying till suggests that infiltration of water to the shallow aquifer is not significant.

The increased density (due to high dissolved solid content) of the invading brine is countered by the effect of high temperature decreasing its density. As the invading brine moves away from the source and cools, its tendency will be to sink as its density increases. However, as existing data show, within a fairly short distance from the Biere well the brine mixes with background water, which, through dilution, diminishes the effect and significance of vertical density gradients. In the vicinity of the Biere well there are numerous complex interplays of density (dissolved solids versus changing temperatures) and viscosity increases as the brine cools, coupled with advective flow controlled by the natural variation in vertical and horizontal permeability, hydraulic gradients and head, and lateral continuity of strata within the shallow aquifer, all of which are affecting the horizontal and vertical distribution of brines. Therefore, the presence or lack of vertical gradients will not be significant indicators of the success or failure of the response action program. There are other indicators that are better suited for tracking the success of the project, including temperature, conductivity, and specific ions (primarily chloride).

Future Contouring and Use of Kriging

Where appropriate, Pioneer does intend to use statistical analysis techniques such as Kriging to help interpret data gleaned from the monitoring wells.

Sampling Parameters

Pioneer will add total silica to the initial list of sampling parameters. Pioneer points out, however, that elevated concentrations of silica in the shallow aquifer does not necessarily indicate a mobilization of Injectrol U into the aquifer. Although Pioneer intends to collect at least one additional round of sampling prior to initiating the response action project, there is little existing data on lateral or temporal background silica values or trends to compare against future data. It is entirely likely, and actually desirable, for some of the Injectrol U to reach the shallow aquifer via the current pathway(s) allowing brine movement. The sealant, in full undiluted strength, must fully fill the pathways to obtain the desired effect. Consequently, there will be, by design, an infusion of sodium silicate (Injectrol U) into the shallow aquifer during the response action project.

Sampling Frequency

Pioneer will undertake quarterly sampling of all of the groundwater wells -- even the wells distant from the response action program -- for the first two years, and then reevaluate the frequency and number of sample events based on the results obtained during that time.

Monitoring Plan Duration

Pioneer understands and appreciates the long duration of natural processes. The proposed monitoring plan called for 2 years of sampling (quarterly on wells near the Biere well and semi-annual on distant wells) at which time the data would be reviewed and proposed changes to the plan presented and discussed with the appropriate agencies. There was never any intent to limit monitoring to 2 years. Pioneer will work with EPA to establish an agreed-upon schedule for further monitoring at the 2-year stage and at any other appropriate stage thereafter.

Criteria for Determining Success or Failure

A return of basic water chemistry in the shallow aquifer to an acceptable condition is the ultimate goal of the response action program and therefore is the general criterion for success. As discussed previously, the primary ionic constituents of the brine are sodium and chloride, with chloride being the single and easiest compound to track. There are many other indicator parameters, ionic constituents and organic compounds that may be of interest or of value to track, but for which background values have not been established. Therefore, it is Pioneer's proposal that as part of the first review meeting after 2 years of data have been collected, the criteria for success of this project will be refined through discussions with the appropriate agencies. At this point, the monitoring parameters identified in the proposed monitoring plan will provide the basis for evaluating the effectiveness of the response action plan. These parameters will show quite clearly whether any brine communication occurring in the vicinity of the Biere well has been sufficiently reduced.

Contingency Plan

If the plugging of the Biere well with Injectrol U is unsuccessful, Pioneer will work with EPA to develop appropriate supplemental response measures, including such possible courses of action as drilling an adjacent independent well, re-drilling the Biere well, reinjection of additional Injectrol U, or other remedies suggested by the results of initial response efforts.

I will call shortly to schedule a meeting or conference call to discuss any outstanding issues. We hope to agree upon a final monitoring plan in the very near future so that it can be attached to the Consent Order.

Sincerely,

Steven L. Leifer

Steven L. Leifer

c: Nathan Wiser, EPA
Marc Skeen, Pioneer Natural Resources USA, Inc.
Wilbur Dover, Pioneer Natural Resources USA, Inc.
Steve Mamerow, Pioneer Natural Resources USA, Inc.

John W. Ross, The Brown Law Firm

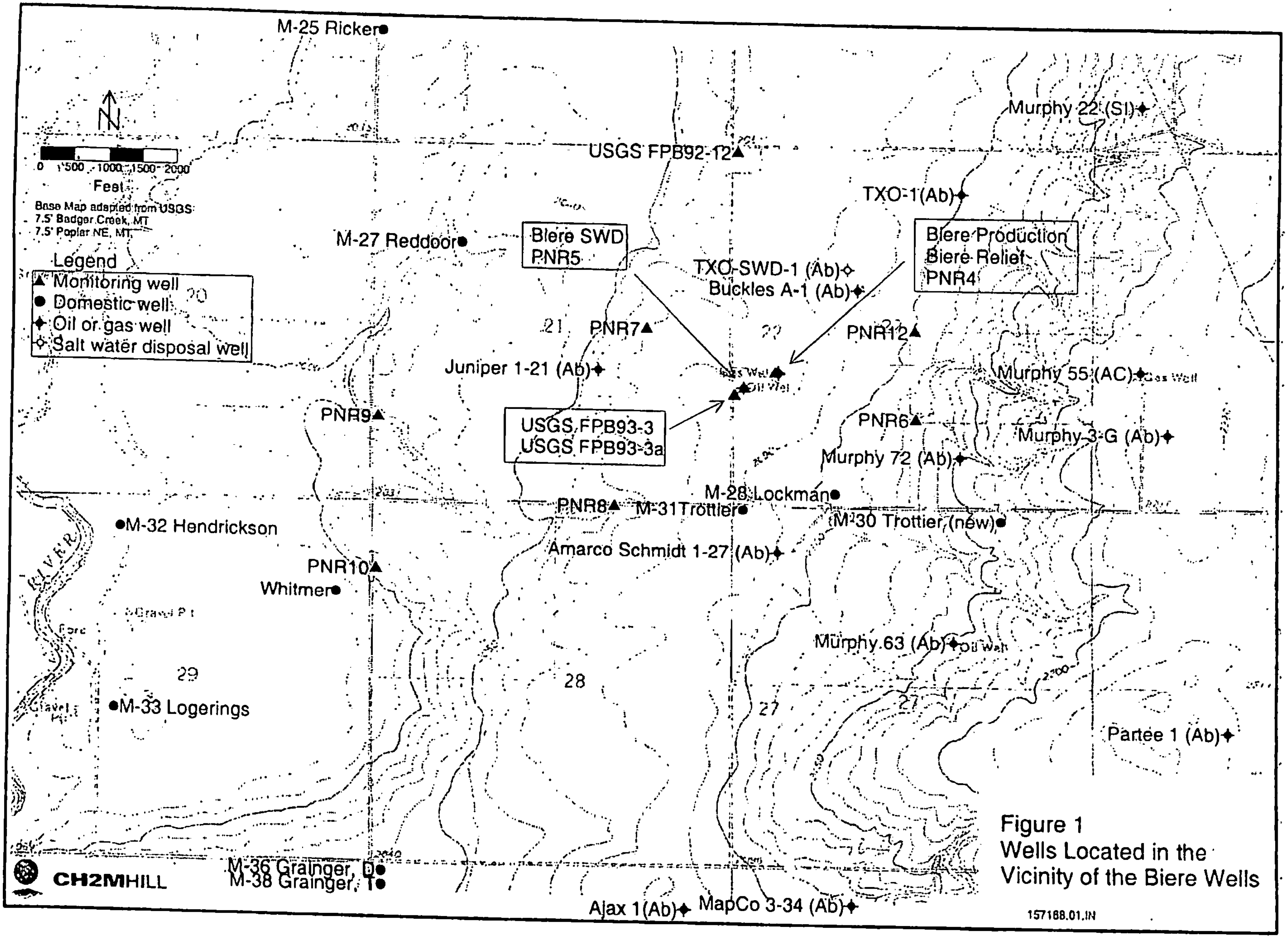

Figure 1
Wells Located in the Vicinity of the Biere Wells

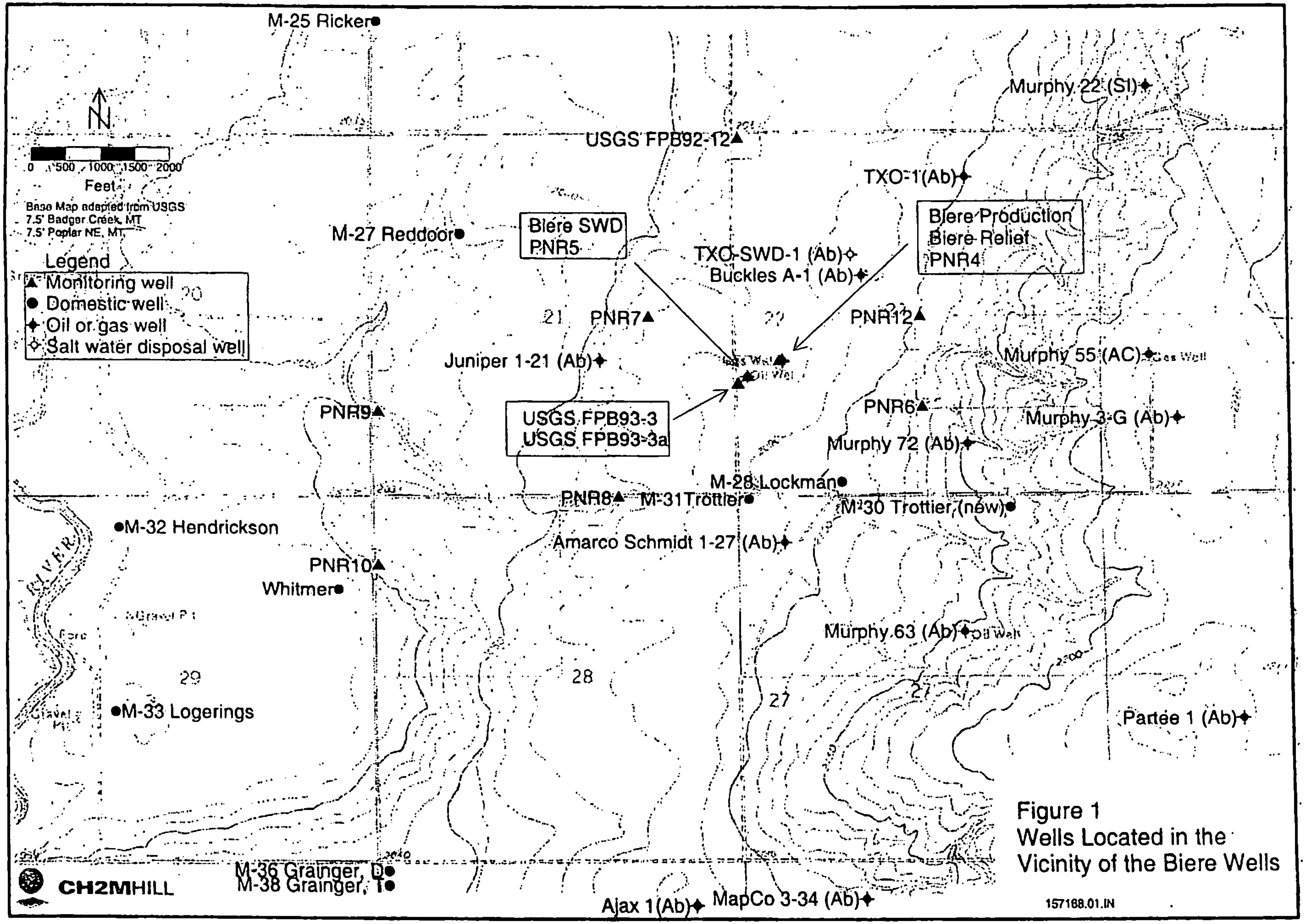

Figure 1
Wells Located in the Vicinity of the Biere Wells

Pioneer's Biere 1-22 Well Solution
(3 800' wells to injection INJECTROL u)

	UIC Well?	Class?	Rule.auth / Permit?
Jon Olson, OECA	Yes	V	Permit
Bill Mann, R4	Yes	V	Rule
Harlan Gerrish, R5	Yes	V	No answer
Mario Salazar, HQ	Yes	V (unless INJECTROL is haz. waste)	Rule or permit
Bruce Kobelski, HQ	Yes	V ?	~~Rule~~ (EASY and it is NO sweat off HQ)
Kurt Hildebrandt, R7	Yes	V	No answer
George Robin, R9	Yes	V	Permit

Around Feb 2001 Timeframe
Synopsis of diff. R's + HQ's opinions on well class for Pioneer wells.

Monitoring Plan for the Shallow Groundwater

Biere Well Response Action Project
Pioneer Natural Resources USA, Inc.

June 2001

INTRODUCTION

History and Background

The Biere well, Figure 1, was drilled in 1972 by Mesa Petroleum. Through subsequent business successions and acquisitions the Biere well is now the responsibility of Pioneer Natural Resources USA, Inc. (Pioneer). In response to indications that the Biere well was allowing thermal brines from oil producing and/or brine injection zones to communicate with and impact the shallow drinking water aquifer, Pioneer conducted a field investigation in the Biere well area, (Field Investigation Report, Biere Well Evaluation, Poplar, Montana (CH2M Hill, August 2000).

In a parallel task, Pioneer evaluated the construction history of the Biere well and prepared a proposed plan to re-seal the well (Proposed Biere # 1-22 Well Response Action Plan, Pioneer Natural Resources, December, 2000). The Response Action Plan, as approved by EPA, provides for the injection of an oil field sealant into the formation in sufficient quantities to seal the formation and the apparently leaking annular seal of the Biere well. The new injection wells will be installed approximately 10 feet from the Biere well on three sides. As presented in the Response Action Plan, the existing Biere relief well will be temporarily re-opened to monitor in-situ conditions during the placement of the primary sealant in the three temporary injection wells installed around the Biere well. Once the sealant is injected into the wells, the Biere relief well will also be injected with the sealant, as necessary, and abandoned.

This document summarizes the additional site characterization and post-Biere well remediation monitoring to be conducted by Pioneer pursuant to the Emergency Administrative Order on Consent entered into by the U.S. Environmental Protection Agency (EPA) and Pioneer in June 2001.

Hydrogeologic Setting and Water Quality

The conceptual model of the shallow groundwater system in the study area consists of a thin (5 to 20 feet typical thickness) aquifer of Quaternary sand and gravel deposits that are widely present on top of the underlying Cretaceous Bearpaw Shale. The aquifer has highly variable hydraulic properties depending on the thickness of the sand and gravel and the amount of fine-grained materials (silt and clay) included in the aquifer sediments. The aquifer is present between the Bearpaw Shale and overlying till. In the study area the groundwater gradients in the Quaternary aquifer are generally toward the Poplar River to the west-southwest. The shallow aquifer in the study area merges laterally with, and discharges into, the alluvial aquifer present along the current Poplar River drainage which flows generally north to south approximately 2 miles west of the Biere well area.

Sources of recharge to the shallow aquifer beneath the study area are only generally identified. There are five potential sources of recharge:

1. Direct infiltration of precipitation;
2. Lateral inflow of infiltration from highlands to the east;
3. Diffuse and/or localized vertical leakage from underlying saline aquifer(s) through structural weaknesses or zones of higher vertical permeability in the Bearpaw Shale;
4. Point source leakage from deep saline aquifer(s) via well bores; and
5. Direct infiltration of fugitive saline fluids stemming from the production of oil and the subsequent storage, transporting, pumping and disposing of this wastewater.

There is insufficient information available to proportion the recharge between the various sources of water. Some or all of these recharge sources may be active locally across the study area.

The pre-Biere well water quality of the shallow aquifer in the study area is unknown. Using the lowest specific conductivity value reported in the various reports prepared on the area by the U.S. Geological Survey (USGS), and in the Field Investigation (CH2M Hill 2000) conducted by Pioneer, and assuming there were no localized natural sources of saline water leakage, the pre-oil field water quality background probably ranged from 1,500 to 2,500 microsiemens per centimeter (uS/cm), which equates to an approximate total dissolved solids (TDS) concentration of 1,100 to 1,500 milligram per liter (mg/l). The dominant ions in the background water are calcium, magnesium and bicarbonate.

Brines in the bedrock saline aquifers and oil production zones beneath the study area have TDS concentrations of 80,000 to 120,000 mg/l and are predominantly sodium chloride. Leakage of these brines via natural pathways, leaking wells and boreholes or from fugitive water released during current and historic handling of the brines has produced localized areas within the shallow aquifer where the water chemistry has been changed from predominantly calcium-magnesium bicarbonate to predominantly sodium chloride. In addition, organic compounds typically associated with the production of petroleum; benzene, ethyl benzene, toluene and xylene (BTEX) have been detected in the shallow groundwater in the study area.

In the immediate vicinity of the Biere well, groundwater in the shallow aquifer is now a predominantly sodium chloride water with a TDS of about 65,000 mg/l. This fact, and the observations of elevated temperature and water level (head) near the Biere well, indicates that the Biere well is an active source of brine leakage into the shallow aquifer.

Elevated heads in the shallow aquifer near the Biere well appear to be a localized impact and the thermal signature quickly dissipates with distance away from the Biere well. The sodium chloride dominated shallow water chemistry signature reveals a relatively constrained chloride plume extending to the west from the Biere well. The westward flow component is also supported by the detection of benzene in monitoring well PNR-7 about 2000 feet west-northwest of the Biere well.

It is difficult to track the extension of the chloride plume from the Biere well more than about one-half mile to the west with any certainty. Benzene is not present above detectable limits in more distant wells and sodium chloride concentrations tend to blend in with the general water chemistry of the aquifer. In addition, there are numerous active and historical oil wells, brine injection and brine handling facilities, in and adjoining the study area, any of which may have in the past or be actively contributing sodium chloride and BTEX compounds to the shallow aquifer chemistry. More specifically, data collected by Pioneer Natural Resources during the field investigation suggests the possibility of one or more additional active sources of brine and BTEX compounds south-southeast of the Biere well. In addition, data collected by the USGS and EPA indicates separate area(s) contributing high TDS water and chlorides adjacent to, and probably intermingling with the northwest extension of the chloride plume from the Biere well.

The difficulty in tracking diffuse plume signatures and in assigning or proportioning recharge sources by chemistry impacts is simply that there appears to be no significant characteristic to differentiate between the numerous and various sources of brine. All brine sources impacting the shallow aquifer, whether from specific wells owned by any of the various oil companies, from years of brine handling across the study area by the many well owners, operators and service companies, or from natural leakage, are all predominantly sodium chloride. Active or recent sources of brine may also carry a BTEX component.

It is within this convoluted mixture of real and potential sources of the same contaminants that the proposed monitoring program must operate to provide meaningful evaluation of the effectiveness of the proposed remedial measures to be implemented on the Biere well.

MONITORING PLAN

Objectives and Approach

The proposed monitoring plan has three primary objectives:

1. Provide additional characterization of the shallow Quaternary aquifer near the Biere well through installation of additional shallow monitoring wells;
2. Evaluation and confirmation that the leakage from the Biere well has been curtailed by the proposed Response Action Plan;
3. Confirmation, by observation of water chemistry changes, of the area impacted by leakage from Biere well.

New Monitoring Wells

Pioneer will install 10 additional monitoring wells in the vicinity of the Biere well at the approximate locations shown on Figure 1. Final well locations are subject to site-specific access and landowner restrictions but Pioneer will strive to locate the wells as close to the proposed locations as possible.

The wells will be installed by hollow stem auger method and completed as 2-inch PVC monitoring wells similar to the previously installed wells (except PNR 4 and PNR 5 which were constructed by mud rotary techniques and are constructed of 2-inch stainless steel). The wells will be constructed to monitor the Quaternary gravel deposits on top of the underlying Bearpaw Shale. Screen length will vary with the thickness of the gravel but typically 10 feet of screen will be installed. Following installation and development, the wells will be surveyed for horizontal and vertical control.

As the boreholes of the three wells at the corners of the Biere well remediation area (Figure 1), are being advanced, water quality parameters (temperature and conductivity) will be collected at the top of the gravel and every 5 feet until the Bearpaw Shale is encountered. Following installation of these wells, Pioneer and EPA will review the field data and determine if there is an adequate gravel thickness and sufficient water quality differences to justify installation of additional shallow wells at these locations to form well nests. If justified by field observations, nested wells, consisting of two to three, independent wells with short well screens may provide additional definition of brine stratification within the Quaternary gravels.

Proposed Monitoring Well Network

There are a total of 24 wells proposed to be included in this monitoring program as listed below. The proposed monitoring program includes all of the monitoring wells installed by Pioneer:

PNR-4	PNR-5	PNR-6	PNR-7
PNR-8	PNR-9	PNR-10	PNR-11*
PNR-12	PNR-13*	PNR-14*	PNR-15*
PNR-16*	PNR-17*	PNR-18*	PNR-19*
PNR-20*	PNR-21*		

The wells with asterisks denote new wells to be installed as part of this plan.

Assuming long-term access agreements can be obtained from the controlling agencies and private well owners, the following additional wells will be included:

USGS FPB 93-3	USGS FPB 92-12
M-27 (Reddoor)	M-28 (Lockman)
M-31 (Trottier)	Buckles-Whitmer

Existing well M-30 is a private well that is not in the Quaternary aquifer affected by the Biere well and therefore Pioneer is not including M-30 in the monitoring program.

Well PNR-4 is located within the immediate working vicinity of the Biere well and the proposed response actions and as such is at risk from the myriad of equipment and drilling activities that will be employed on this project. Pioneer will take reasonable precautions to protect PNR-4 through the use of concrete barriers, flagging and contractor awareness but complete safety is not assured. It is also possible that the drilling equipment used in the response action will unavoidably have to be set up such that PNR-4 must be disturbed or destroyed. If, in Pioneer's opinion, PNR-4 cannot be protected or must be abandoned, the well will either be temporarily abandoned or plugged and abandoned. Temporary abandonment will be accomplished by filling the screen section with sand and the remainder of the casing with bentonite and the wellhead cut off and sealed at ground level. If the well must be plugged and abandoned, it will be filled with cement grout and cut off 2 feet below ground level.

A shallow well into the Quaternary gravel in the immediate vicinity of the Biere well is critical to the post remedial monitoring to determine the effectiveness of the response actions taken on the Biere well. Consequently, if PNR-4 must be plugged and abandoned, Pioneer will install a replacement well in this area as soon as the drilling equipment used to install the injection wells is removed.

Monitoring Schedule and Duration

The new wells will be installed in the summer 2001 field season. After all new wells are installed and access agreements reached for existing private wells, a complete round of samples will be collected. This sampling event should occur in late summer/early fall 2001. Pending availability of drilling contractors, the Biere well remediation is anticipated to occur in the late fall 2001. A second round of samples will be collected from all monitoring wells just prior to the remedial activities at the Biere well. Immediately after the Biere well remedial measures have been completed, all monitoring wells will again be sampled. Sampling will be repeated quarterly for 2 years (8 quarterly samples) after the Biere well remediation has been completed.

Quarterly sampling will typically be conducted in March, June, September and December. The schedule for winter and spring sampling events will be flexible to avoid inclement weather. To the extent possible the samples will be collected during the same annual time frame to allow seasonal comparison of water chemistry trends.

The results of each sampling event will be submitted to the appropriate regulatory agencies for general information. At the end of the initial 2-year period, the results of the 8 quarterly samples will be combined with the existing available water chemistry data and presented in a written report to the regulatory agencies. This report will provide analysis of the results relative to the objectives of the monitoring program and will provide the basis for discussions with the agencies regarding any modifications to the monitoring program. A logical long term monitoring program consists of more frequent sampling of wells near the Biere well and less frequent sampling at wells distant from the Biere well. Consequently, at the end of the initial 2-year monitoring period, a semi-annual sampling schedule or a combination of quarterly and semi-annual sampling schedules may be adopted.

After 5 years of post-Biere well remediation monitoring, the data will again be compiled into a comprehensive report and discussions with the regulating agencies will be held to establish a long term monitoring program consistent with, and in conjunction with other basin wide remedies and actions stemming from the EPA's basin wide order to address water quality issues stemming from oil production activities in the East Poplar Oil Field.

Analyses

The proposed monitoring parameters consist of:

Temperature*	Specific Conductivity*
pH*	Total Dissolved Solids
Sodium	Chloride
TPH	BTEX
Total Silica	

Asterisks indicate field parameters. Temperature, specific conductivity and pH will be measured in the field as the well is being purged prior to sampling. Specific conductivity and pH will also be determined in the laboratory. Total silica is included initially for all wells because the proposed sealant for the Biere well remediation is a sodium silicate based product. Once a reasonable baseline value for silica is established it will be dropped from the list of quarterly analytes except for the six wells in the immediate vicinity of the Biere well (PNR-4, PNR-5, PNR-14, PNR-15, PNR-17, USGS FPB93-3)

Initially, and on an annual basis thereafter, all wells will be sampled for additional ions to allow water typing, to evaluate changes in other chemistry parameters and for use in establishing water chemistry relationships between wells. The supplementary parameters are:

Calcium	Magnesium
Potassium	Total Hardness
Alkalinity	Bicarbonate

Carbonate | Nitrogen (Nitrate plus Nitrite)
Total Silica

Sampling Procedures

Water Level Measurements

Within one 24-hour period at the start of each sampling event, water levels will be measured in all wells for which access can be obtained and that are not being actively pumped. Buckles-Whitmer, and possibly M-27, are active wells for which a water level measurement may not be feasible to collect.

Sequence and Methodology

All wells will be sampled in a generally "clean" to "dirty" sequence, based on previous sample data, beginning with the wells most distant from the Biere well and culminating with PNR 4. Sampling will be conducted using industry standards for general environmental investigations and will be sampled using a variety of equipment depending on the physical condition of the well, depth to water, and the existence or availability of existing equipment.

The monitoring wells and wells M-28 and M-31 will be sampled using a portable submersible sampling pump that is flushed and decontaminated between samples. Water level in well PNR 8 is too deep and the well does not make enough water to sample with a pump and therefore a Teflon bailer will be used to sample this well. The Buckles-Whitmer and M-27 domestic wells will be sampled directly from the existing pump discharge from a faucet or tap that is not affected by any water softeners or filters.

Well PNR-4 has an accumulation of oil on the water surface and repeated monitoring of this well under these conditions is problematic. The initial monitoring approach for PNR-4 will be as follows:

The depth to the top of the oil will be measured;

The oil will be pumped or bailed off and contained;

A dedicated, but not permanently installed, sampling pump will be used to purge and sample formation water;

Water levels prior to sampling and following sampling will be monitored to establish a representative direct measurement of formation head without significant interference from accumulated oil or the need to make liquid phase density corrections;

The containerized oil and water will be collected and disposed of by a licensed waste oil hauler.

Depending on the logistical difficulties associated with containment and disposal of the oil and pre-sample purge water, Pioneer may explore various alternative monitoring approaches for this well including, but not limited to, retrofitting the well with a smaller diameter liner open only at the bottom or the use of in-situ probe(s) to measure temperature, head and conductivity. If a suitable pressure transducer, thermistor and conductivity probe is used only periodic confirmation samples and direct measurements will be collected following the procedures outlined above. As of the date of this monitoring plan, dedicated equipment capable of handling the elevated temperature and high conductivity anticipated for this well has not been located and therefore the sampling procedures provided above will be followed.

EPA has expressed concern that the accumulation of oil in PNR-4 may make effective monitoring of this well impossible. As stated previously, a monitoring well at this location is vital to the post response action-monitoring program. If, Pioneer is unable to overcome the effects of the accumulated oil through sampling techniques, installation of a liner, or dedicated probe(s), a replacement well will be installed. If a replacement well is required, the current PNR-4 will be plugged and abandoned as described previously. A replacement well will not be installed until after the injection wells are installed to avoid potential damage to the new well. Pioneer will present EPA with drilling prospectus and proposed well construction plan prior to installation of new well at this location.

Purge Water Handling

Water removed prior to sampling (purge water) will be handled according to the salinity of the water as determined by field conductivity measurements or if BTEX constituents have been previously detected. Water with a conductivity of 5,000 umhos/cm^2 (5.0 millisiemens/cm) or less will be discharged directly on the ground near the wellhead in such a manner as to prevent the water from accumulating near the well. Water with a conductivity greater that 5,000 umhos/cm will be containerized at the wellhead. Containerized purge water will be transported from each well to a central, temporary, storage container to be established on the Biere well work pad. Water with oil and or from wells with known BTEX constituents will be contained separately from water with only high salinity. The specific conductivity of the containerized water will be measured and a sample collected for BTEX and TPH at the end of each sampling event. The results of this sample will be used to determine appropriate disposal of the contained liquid. The final containment and disposal method for the sample purge water has not been identified at this time but will have to be finalized and agreed to prior to sampling. The disposal options that are being considered are discussed in the following paragraphs.

If BTEX constituent concentrations are below their respective Maximum Contaminant Limit (MCL), and arrangements can be reached with either the cities of Poplar or Wolf Point, a contract will be established with a local vacuum truck service to retrieve the water and dispose of it in the sewage treatment system.

If oil is present or if BTEX concentrations are above MCL's, a licensed waste oil hauler will be contracted to retrieve and dispose of the liquids offsite at an approved facility.

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Quality Assurance/Quality Control

Chain of Custody and Analytical Methods

All samples will be submitted following standard Chain of Custody (COC) protocols to a state approved, independent laboratory for analysis using the current EPA methods prescribed in SW-846. Laboratory detection and reporting limits will meet or exceed (be less than) the State of Montana or EPA groundwater protection standards for the specific compound or constituent. Laboratory QA/QC procedures for organic analyses, including Reagent Blanks and Surrogate Recovery Reports will be provided by the laboratory with each analytical report.

Field, Equipment and Travel Blanks

One set of field blanks, equipment blanks, and travel blanks will be collected during each sampling event to evaluate whether the organic sample results are being adversely impacted by secondary contaminant sources including cross contamination from equipment, bottle contamination or contaminants introduced during shipping. Because of the higher reporting limits, no QA/QC blanks will be collected for the non-organic constituents and parameters being analyzed for.

Because of the sensitivity of the analysis, BTEX samples will be stored and shipped separately from the other sample containers. Samples with known or suspected BTEX constituents will be stored and shipped separately from other BTEX samples. A travel blank will accompany each BTEX shipping container.

One field blank will be collected during each sampling event. The field blank will be prepared by pouring laboratory grade de-ionized water into a 40 ml vial to simulate ambient conditions at the well head when the actual BTEX sample was collected.

One equipment blank sample will be collected during each sampling event. As with the field blank, the specific well where the sample is collected will vary from event to event at the discretion of the sampling team. The procedure for the equipment blank will vary depending the sampling equipment being used. For bailed wells, if a re-useable bailer is being used, between uses the bailer will be washed and rinsed using soap, de-ionized water, a methanol rinse then followed by a second rinse of de-ionized water. Prior to collecting a sample with the bailer from a well designated to have an equipment blank collected, the bailer will be filled with laboratory grade, de-ionized water, then a 40 ml vial sample bottle will be filled from the bailer and submitted for BTEX analysis.

Equipment blank sample preparation for wells sampled by portable, non-dedicated, sample pumps will vary somewhat depending the type of pump used. To the extent possible, dedicated tubing will be used for each well to avoid cross contamination issues. The general procedure for pump decontamination and collection of equipment blanks is as follows. The pump will be washed and rinsed between uses and between wells by pumping approximately 1 gallon of a soap solution followed by 2 to 3 gallons of rinse water through the pump. If non-dedicated pump discharge hose is used the decontamination solution will be pumped through the tubing. The wash and rinse water will be directed over the pump electrical cable to simultaneously decontaminate the wire. An equipment blank will be prepared by inserting the pump into a source of laboratory grade de-ionized water and collecting a sample in a 40 ml vial following the same procedures as would be followed in collecting a normal sample. The equipment blank sample will be submitted for BTEX analysis.

Duplicate Samples

Periodically, at the discretion of the project team, blind duplicate samples may be collected and submitted for analysis. In general duplicate samples will be used to verify BTEX results in pertinent wells. Blind duplicates will be collected by sequentially filling two sets of 40 ml vials from the sample pump discharge stream. One set will be fully labeled, including well number, date and time; the duplicate set of vials will be labeled with a simple identifier but will not include date or time. Duplicate samples will be submitted under COC protocols with the normal samples. The specific well(s) from which duplicate samples will be collected, in any, have not been established.

Split Samples

Split samples (duplicate samples sent to two different laboratories) are not anticipated at this time. However, Pioneer may submit split samples for several reasons, including questions or concerns about the accuracy of the laboratory or to provide data for comparison of laboratories. It is also anticipated that interested parties or regulatory agencies may request split samples for submission to their own independent laboratories. Pioneer will attempt to accommodate requests for split samples by providing access to the sample discharge streams during a scheduled sampling event so the requesting party can collect their own samples.

Anticipated Monitoring Response to Biere Well Remediation

The monitoring program described above contains elements to continue the characterization efforts necessary to establish the area of impact and groundwater flow paths transporting oil field brines from the Biere well and surrounding study area, and to provide field and analytical data useful for evaluating and monitoring the effectiveness of the proposed remedial measures at the Biere well.

The underlying and long-term metric for evaluating the effectiveness of the Biere well remediation is that the water chemistry in the Quaternary groundwater system is restored to background levels. However, over the many years of oil field activities in and around the Biere well, a large mass of ions and organic constituents have been released and are present in the soils and groundwater within the impact area. In addition groundwater flux (volumetric flow rate) through the system does not appear to be very high and consequently it will likely take many years for the groundwater system to reach background levels once the Biere well is sealed.
Although the ultimate evaluation is long-term recovery, it is essential that short-term

responses in nearby monitoring wells be used to monitor the effectiveness of the remedial measures at the Biere well. Using organic compounds for monitoring criteria to evaluate remediation success near the Biere well is problematic due to the mass of hydrocarbons present and the highly variable factors that control their concentrations in groundwater. Therefore, the most effective way to gauge success is by monitoring TDS through specific conductivity and specific ions, temperature and head (water levels) in the nearby wells. Using these parameters as indicators, the post remediation monitoring data is anticipated to fall into one of these general categories depending on the following scenarios:

No change, or worse, an increase in these parameters - the remedial measure failed.

Rapid decrease in nearby wells followed by progressive change in more distant wells over time - complete or significant partial success.

Rapid decrease in nearby wells but quickly stabilizing at levels well above background - partial success.

A downward trend in any of the major indices followed by a significant and distinct reversal - a temporary success, i.e. break through.

In the wells nearest the Biere well, a logical progression of the basic monitoring parameters, in order of expected response, indicative of successfully sealing the Biere well is as follows:

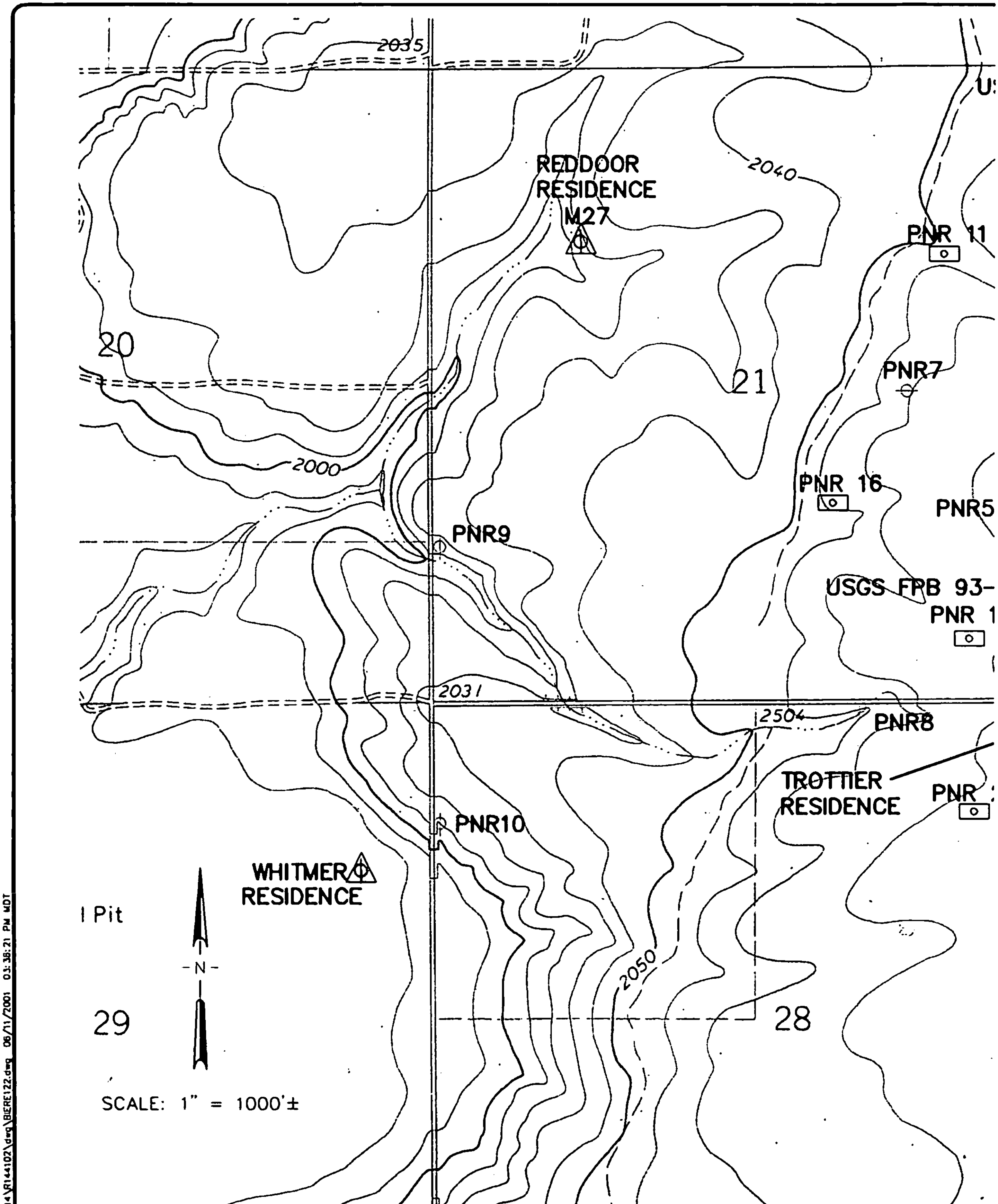
A very rapid reduction in pressure or "head" in the aquifer near the Biere well.

Noticeable temperature decrease in the Quaternary aquifer over several monitoring cycles.

A distinct decrease in TDS (as represented by decreases in conductivity, chloride, etc.) trending toward background but possibly requiring several seasons of advective groundwater flow to be fully apparent. Wells on the up gradient side of the Biere well and those in high flow parts of the aquifer should improve first. It will probably take multiple years to reach background depending on advective flow rates and groundwater flux through the system.

For the purposes of monitoring immediate success of the remediation - those wells near the Biere well will provide the most useful data. Assuming success in sealing the Biere well, with time, sampling data from the distant wells should also provide confirmation that the Biere well was successfully sealed.

Long-term recovery of the impacted groundwater as demonstrated by improving water quality trends in distant wells, may require significant time to develop. However, with increasing distance, and time, from the Biere well, there is also more opportunity for regional impacts and other unknown sources to affect the water chemistry. The summary report and review meetings proposed after two years, and five years of monitoring following the Biere well response action will provide valuable check points to evaluate the effectiveness of the response action and to identify appropriate changes to the monitoring program based on the data collected.



SOURCE: USGS QUADS., POPLAR NE & BADGER CREEK, HKM 2000 SURVEY, EPA SITE SKETCH, USGS 1997 GROUNDWATER STUDY.

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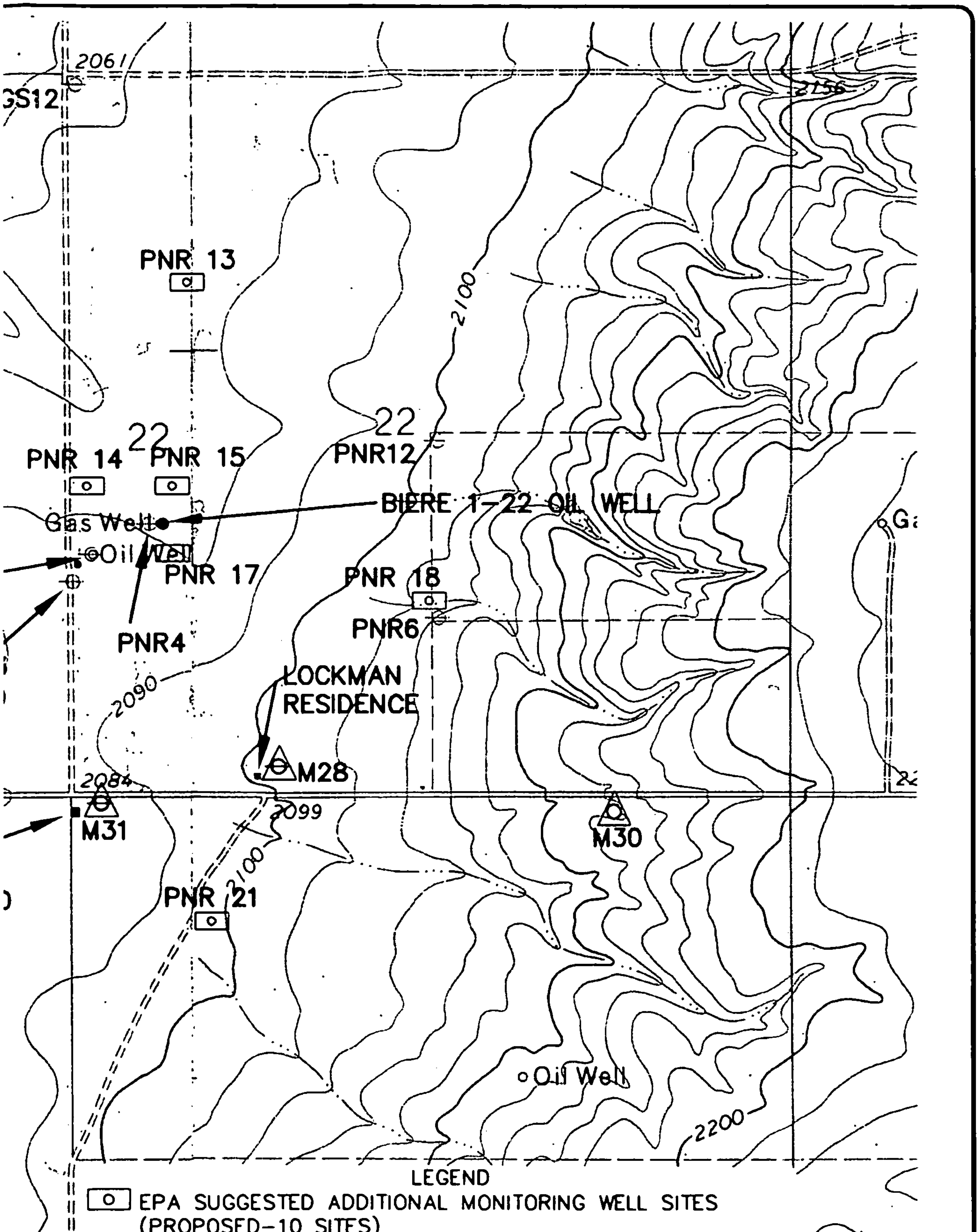


LEGEND

- [o] EPA SUGGESTED ADDITIONAL MONITORING WELL SITES (PROPOSED–10 SITES)
- ● BIERE 1-22 PRODUCTION WELL
- MONITORING (0–100') WELL, 3 MO. SAMPLE. (EXISTING)
- MONITORING (0–100') WELL, 6 MO. SAMPLE. (EXISTING)
- DOMESTIC WELL

NAME NOTE – USGS-FPB-93-3 (USGS MONITOR WELL), M-31 (USGS 1997 STUDY, DOMESTIC WELL NUMBER)
PNR-6 (PIONEER NATURAL RESOURCES USA, INC. MONITOR WELL

FIGURE 1

HKM ENGINEERING

14R144.102

JUNE 11, 2001

WELL LOCATION MAP
BIERE1-22 OIL WELL
EAST POPLAR OIL FIELD
POPLAR, MONTANA

HALLIBURTON

Halliburton Energy Services
10200 Bellaire Blvd Houston, TX 77210

Table of Contents

HALLIBURTON
Halliburton Energy Services
10200 Bellaire Blvd Houston, TX 77210

1 Proper Identification

Many mechanical and chemical shut-off techniques exist in today's market. These types of solutions can be very successful if designed and placed properly. In order for this to occur it is very important to properly assess the "real" problem of unwanted production. It is imperative that proper identification of not only where the unwanted production is coming from, but why. With a basic knowledge of reservoir behaviour and the primary causes of conformance problems, a reservoir description team can examine various wellbore and reservoir parameters to pinpoint any conformance problems that might exist in a given area; the following sections describe some of the potential causes.

1.1 CONFORMANCE PROBLEM SOURCES

Conformance problems are classified as either near-wellbore problems or reservoir-related problems. Some problems, however, could easily be placed in both categories. For example, barrier breakdown is related to fracturing out of zone and could be considered reservoir-related, but it is considered a near-wellbore problem. Similarly, although coning and cresting occur in the near-wellbore region they can result from a completion too near the water or gas zone, they are considered reservoir-related.

1.1.1 NEAR-WELLBORE PROBLEMS

1.1.1.1 CASING LEAKS

An unexpected increase in water or gas production could be the result of a casing leak. Production logs, such as temperature, fluid density, Hydro, and flowmeter (spinner), can help, individually or in combination, locate where various fluids are entering the wellbore. Thermal multigate decay (TMD) and pulsed spectral gamma test (PSGT) logs can also be used. These tools detect water entry and water flow into casing. Casing evaluation logs are used to find holes, splits, and deformities that could allow unwanted fluid entry. These logs also detect corrosion conditions that could eventually cause leaks.

1.1.1.2 CHANNELS BEHIND CASING

Channels can develop behind the casing throughout the life of the well, but such channels are most likely to occur immediately after the well is completed or after the well is stimulated. Unexpected water production at these times strongly indicates that a channel may exist. Channels in the casing-formation annulus result from poor cement/casing bonds or cement/formation bonds.

1.1.1.3 BARRIER BREAKDOWN

Even if natural barriers, such as dense shale layers, separate the different fluid zones and a good cement job exists, the shales can heave and fracture near the wellbore. As a result of production, the pressure differential across these shales allows fluid to migrate through the wellbore. More often, this type of failure is associated with stimulation attempts. Fractures can break through the shale layer, or acids can dissolve channels through it. Temperature logs, TMD logs, and PSGT logs can be used to detect fluid migration as a result of barrier breakdown.

1.1.1.4 COMPLETION INTO OR NEAR WATER OR GAS

Completion into the unwanted fluid allows the fluid to be produced immediately. Even if perforations are above the original water-oil contact or below the gas-oil contact, proximity to either of these interfaces allows production of the unwanted fluid, through coning or cresting, to occur much more easily and quickly. Engineers should re-examine core data, the driller's daily report, and openhole logs to determine the cut-off point of moveable water. Data from resistivity and porosity logs, for example, can be combined to determine the location of water and pay zones.

Overview

1.1.2 Reservoir-Related Problems

1.1.2.1 Coning and Cresting

Fluid coning in vertical wells and fluid cresting in horizontal wells both result from reduced pressure near the well completion. This reduced pressure draws water or gas from an adjacent, connected zone toward the completion. Eventually, the water or gas can break through into the perforated section, replacing all or part of the hydrocarbon production. Once breakthrough occurs, the problem tends to get worse, as higher cuts of the unwanted fluid are produced. Although reduced production rates can curtail the problem, they cannot cure it. Fluid density, Hydro, PSGT, and TMD logs can help engineers determine the point of water entry into the wellbore. The PSGT and TMD logs can also indicate the present location of the water-oil contact before break-through. In addition to these logs, engineers can run additional well tests to detect bottomwater encroachment.

1.1.2.2 Channelling Through Higher Permeability

High-permeability streaks can allow the fluid that is driving hydrocarbon production to break through prematurely, bypassing potential production by leaving lower permeability zones unswept. As the driving fluid sweeps the higher-permeability intervals, permeability to subsequent flow of the fluid becomes even higher, which results in increasing water-oil or gas-oil ratios throughout the life of the project. Tracer surveys, interference and pulse testing, reservoir simulations of the field, reservoir descriptions, and reservoir monitoring are used for channel detection. Tracer surveys and interference and pulse tests verify communication between wells and help engineers determine the flow capacity of the channel. Reservoir description and monitoring verify the location of fluids in the various formations. The data available through reservoir description allow engineers to produce more accurate models of the formations and then simulate fluid movement through the reservoir. Permeability variations between zones can be revealed by core test results or pressure transient test results of individual zones.

1.1.2.3 Fingering

Unfavourable mobility ratios (>1) allow the more mobile displacing fluid (from either primary or enhanced recovery operations) to finger through and bypass large amounts of oil. Once breakthrough occurs, very little additional oil will be produced as the drive fluid continues to flow directly from the source to the production well. Reservoir and drive fluid mobility's derived from fluid and core data are probably the most important factors for determining whether fingering is a potential problem. Engineers can use reservoir simulations or available information on ideal systems to determine if sweep efficiencies are within range of what would be expected if fingering did not exist.

1.1.2.4 Fracturing Out of Zone

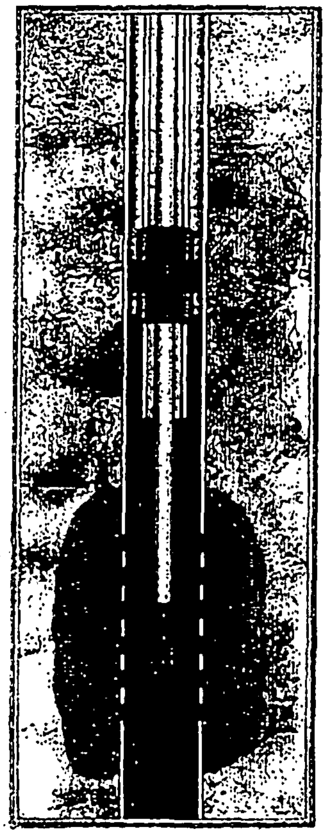
An improperly designed or poorly performed stimulation treatment can allow a hydraulic fracture or acid fracture to a water or gas zone. If the stimulation is performed on a production well, an out-of-zone fracture can allow early break-through of water or gas. If the fracturing treatment is performed on an injection well, a fracture that connects the flooded interval to an aquifer or other permeable zone can divert the injected fluid to the aquifer, providing very little benefit in sweeping the oil zone. Engineers can use temperature logs, tracer surveys, and detailed reviews of the fracturing treatment to identify this problem. Microfrac treatments and long-spaced sonic logs, usually performed before the fracturing treatment, help verify the existence of vertical stress contrasts that might be great enough to contain fracture height growth.

1.1.2.5 FRACTURE COMMUNICATION BETWEEN INJECTOR AND PRODUCER

Natural fracture systems can provide a direct connection between injection and production wells, allowing injected fluid to move through these higher-permeability channels, bypassing hydrocarbons within the rock matrix. Even if natural fractures intersecting two wells are not directly connected, fluid can preferentially flow through one fracture until it is in close proximity to another fracture or wellbore, crossing through and sweeping only a small portion of the matrix. Natural fractures serving as flow channels can be confirmed by chloride level comparisons and tracer surveys. Reservoir description should locate the discontinuities, and reservoir monitoring should detect the movement of fluids through the fracture system. A combined analysis of pressure build-up or drawdown data and interference data allows engineers to estimate the properties for both the matrix and the natural fracture system. Poorly oriented hydraulic fractures can also provide channels that allow injected fluids to bypass much of hydrocarbon production. Although created fractures rarely interconnect two wells, a hydraulic fracture still provides a channel of higher conductivity that allows much of the reservoir fluid to be bypassed. Preferred fracture orientation and the possibility of enhanced recovery operations should be considered during the reservoir's initial development. Various technologies, such as Microfrac analysis and anelastic strain recovery, allow engineers to determine the expected direction of fracture growth. If engineers know the lengths and directions of any hydraulic fractures, they can use reservoir simulations to model flow through the system and determine the expected sweep efficiency.

Understanding of Challenge

2 Placement



Most of Halliburton's chemical solutions can be pumped into a live well atmosphere. In addition, each of the chemicals can be easily cleaned out of the wellbore to provide full-bore access after placement. The clean out of the PermSeal and H_2Zero™ systems can be performed with coiled tubing, using current jetting technology. Because of the higher inherent strength of Cement it may be necessary to drill out after placement.

Proper placement of each of the chemical solutions will depend on determining the problem, as described in the Conformance Problem Sources section of this document. Once this has been determined, there are several methods that can be used to accurately place any of the listed systems. These methods are as follows.

2.1 Bullheading

The simplest, most economical treatment placement method is the bullheading technique, in which operators inject the treatment without isolating the targeted zone. This technique can be used effectively for entry into zones that will take 100% of fluids or for entry into perforations where a permeability decrease is necessary. Bullheading is seldom recommended, however, because without zone isolation, the treatment may seal not only the intended water or gas zone but the oil zone as well. To design an effective placement procedure and responsive treatment, engineers must carefully consider well conditions and reservoir characteristics.

2.2 Mechanical Packer Placement

For added control, operators can use mechanical packers, bridge plugs, or selective zone packers to isolate perforations or a portion of an openhole completion into which a treatment will be placed. This method protects critical perforations in the adjacent oil interval from sealant invasion. To determine the packer's degree of placement control on the zone, engineers must test for injectivity and communication aspects.

2.3 Dual-Injection Placement

When performing dual-injection placement operators use the well's tubulars to inject fluids down the tubing and down the annulus. Packers, bridge plugs, sand plugs, chemical plugs, chemical packers, and other mechanical means are usually used with this technique. By isolating intervals with tools or covering intervals with sand backfill, operators can more accurately target the preferred treatment intervals. The dual-injection placement technique offers efficient placement control. To protect critical perforations in the adjacent oil-producing zone from the treatment solution, operators inject a non-sealing fluid that is compatible with the formation. Ideally, dual-injection placement directs fluids along the interface away from the wellbore and far enough into the formation to change the injectivity or the production. After considering the density, viscosity, and frictional pressure differences of the two injection streams, engineers normally equalise the BHIP to control placement when using this technique.

2.4 ISOFLOW PLACEMENT

When using the isoflow placement operators direct the treatment solution into the selected interval(s) while protecting the hydrocarbon-producing or hydrocarbon bearing zone by simultaneously injecting a non-sealing, formation-compatible fluid that contains a radioactive "tag" down the annulus. Before the treatment is run, a gamma-ray detection tool is run down the well inside the tubing and placed at the interface between the upper non-sealing and lower sealing point in the well. During the initial analysis and sometimes during the sealant placement, engineers analyse the output from the tool to regulate tubing and annulus pump rates. To adjust the location of the interface, operators can manipulate the pump rate of the tubing and annulus fluids.

2.5 TRANSIENT PLACEMENT

When the injectivity profile and shut-in crossflow on many wells are analysed, it may become apparent that the well could produce fluid during static conditions from one interval into another. The analysis may also indicate that the well may be crossflowing at a particular rate from other intervals while injection is being performed at a particular rate. Once a sufficiently high rate is established, these wells may not show a crossflow. Transient placement techniques use crossflow to help eliminate entry into unwanted intervals as treatments are injected into the zones that will be sealed. The fluids from the treatment and crossflow are allowed to intermix in this placement procedure. While designing treatments, engineers must perform tests to determine if compatibility and sealant concentration will seriously affect the treatment. For example, since transient flow and injection flow intermixing will occur, engineers must analyse injectivity profiles by performing multi-rate tests to determine the concentration of the treatment solution fluid.

3 Chemical Shutoff

Many chemical shut-off techniques exist in today's market. These types of solutions can be very successful if designed and placed properly. Chemical methods currently available for controlling unwanted production range from a variety of water-based polymer systems to hydrocarbon-based, ultrafine Portland cement slurries, and include recent resin technology. In production wells, the success of the treatment is generally measured by changes in the well's water or gas production. After a treated production well has been shut-in for the recommended time, production is slowly resumed. If the treatment was designed to seal a casing leak, pressure testing to the required pressure determines job success or failure. For all other applications, a successful treatment should decrease the amount of produced water or gas. When designing a water-control project, engineers must first carefully consider the purpose of the program. Specifically, they must make certain that the physical and chemical characteristics of the solutions used will not contradict with any immediate or future plans for the reservoir. For example, design engineers would not recommend an Injectrol ® treatment into an interval if they were planning an improved oil recovery job in that same interval at a later date. Instead, they would choose a material that would not permanently seal the zone, such as PermTrol. Regardless of the treatment planned, engineers should always order laboratory-scale tests to evaluate recommended treatment formulations before the actual treatment is performed.

3.1 H_2ZERO™

H_2Zero™ service uses a revolutionary polymer system to provide unprecedented capabilities for controlling unwanted water and gas production. H_2Zero™ is a crosslinkable polymer system that combines state-of-the-art engineering and chemistry to provide a fully designed, smart gel treatment. H_2Zero™ forms a permanent seal in the target zone. It is effective in preventing flow of both water and gas. H_2Zero™ consists of two components: the base polymer, HZ-10, and the organic crosslinker (non-metallic), HZ-20. HZ-10 is a low molecular-weight solution polymer that is crosslinkable with either organic or metallic crosslinkers. HZ-10 is an acrylamide co-polymer with enhanced thermal stability, which forms strong covalent bonds with the organic crosslinker, HZ-20. Because both components are in solution, they need only to be diluted in the mixing brine, therefore H_2Zero™ formulations can either be batch mixed or blended on the fly. The two components are placed as a low-viscosity fluid (5-33 cp) which forms a solid gel when heated to bottomhole temperatures at predictable times. H_2Zero™ can be mixed in KCl brine, NaCl brine, or seawater. H_2Zero™ has a broad temperature range of 150°F to 320°F (66°C to 160°C). H_2Zero™ is stable in both CO_2 and H_2S. Core test results have shown a reduction of permeability to water of 99.9%, and a returned RRF in a highly permeable carbonate of 4.5. Results of these tests are included in the attachment section of this document, Section **Error! Reference source not found.**

3.1.1 APPLICATIONS

H_2Zero can be used to prevent or treat the following conformance challenges:

Producing Wells	Injection Wells
• Acid went to water	• Casing leaks
• Bottomwater coning	• Channel to producer
• Bottomwater shutoff	• High-permeability streaks
• Casing leaks	• Injection out of zone
• Channel from water injector	• Natural fractures
• Early water breakthrough	• Plugging well
• Frac job went to water	• Seal previous stimulation treatment
• High-permeability streaks	
• Natural fractures	
• Plugging well	
• Seal high-pressure zone	

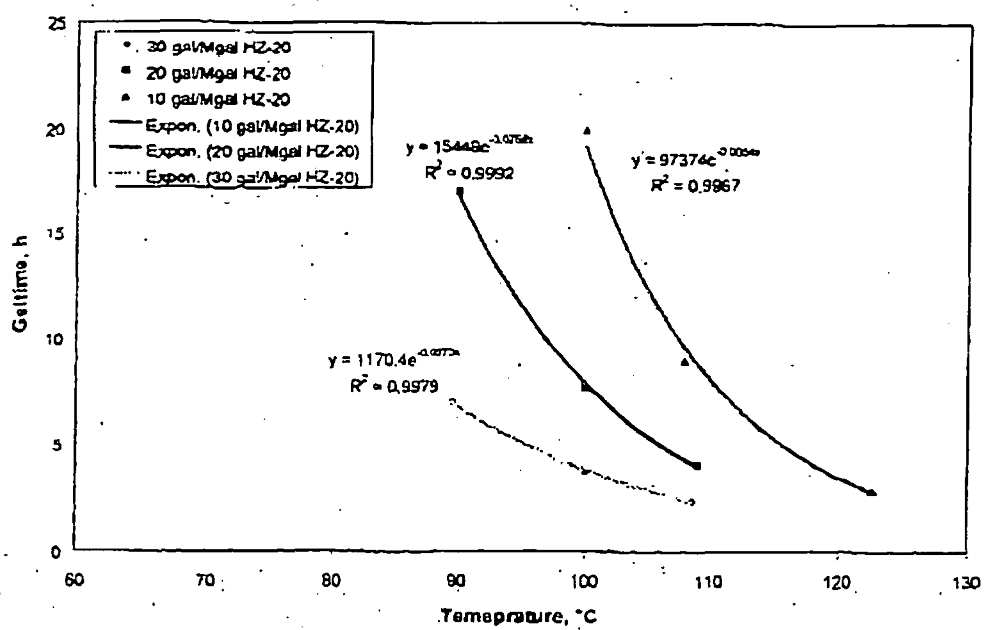
Understanding of Challenge

Table 2 - Advantages, Disadvantages and Critical Design Factors for H_2Zero™ Service

Advantages	Disadvantages	Critical Design Factors
• Water-thin placement • Deep matrix penetration • High Temperature Applications • Environmentally Friendly • Resistant to H_2S, CO_2, acid • Organic Crosslinker • Permanent Barrier	• Right Angle Set – so difficult to squeeze • Added viscosity can aid in uniform gel placement	• Proper problem identification • Proper fluid selection based upon BHST/BHIT • Placement technique • Oxygen scavenger ahead and behind

3.1.2. Mix Waters

Proposed mixing water should always be compatible with the formation. The approved mixing waters for H_2Zero are KCl brine, NaCl brine, or seawater. Mix waters other than 2% KCl or seawater will affect pump time and the quality of the final product, and should be checked before running a job.



H_2Zero™ Gel Time Examples

Understanding of Challenge

3.2 PermSeal

PermSeal service is an environmentally acceptable gelation system designed to reduce or plug permeability to water in hydrocarbon-producing wells. The gelation system is pumped as a water-thin fluid into the isolated water bearing permeability. The well is then shut-in to allow polymerization into an elastomeric gel.

The PermSeal system is a batch blend that is pumped into the formation at rates below parting pressure. The system utilizes a temperature-activated initiator to induce a phase change from a liquid to a solid at predictable times. The PermSeal 600 System, the newest addition to the Halliburton PermSeal family of well conformance products, has been designed specifically to reduce production expenses and re-establish well productivity. Pumped as a water-thin fluid, the PermSeal gel system reacts in-situ to form a crosslinked polymer mass which can (1) seal water producing and high pressure zones, (2) minimize waterflood and CO2 channelling and (3) control gas migration and lost circulation at deviated well kick-off points. Bottomline, PermSeal gel delivers maximum value to operators seeking cost-effective solutions for matrix or fracture conformance problems. Shut-off gas or water intrusion, PermSeal counteracts the effect of the drawdown pressure, stopping unwanted gas or water. PermSeal has been used successfully on the first water shutoff treatment for A01A. It has proven to sustain strength in at high temperatures, and should be considered as an alternative to the H_2Zero™ System.

3.3 Injectrol U

INJECTROL sealant is an inorganic material which has proven very successful in forming a permanent barrier to water in both producing and injection wells. INJECTROL is placed as a water-thin fluid, which changes to a very firm gel at a controlled time. The initial low viscosity of the treating fluid combined with the firmness of the gel allows for the depth of penetration and strength required for effective matrix sealing.

Zone isolation may be necessary when treating either a producing or injection well. Placement techniques include packers, treating perforations, and dual injection and isoflow methods. Matrix rates should be maintained. INJECTROL service is applicable between 60 F and 260 F.

Advantage

- Inexpensive materials allow large volume treatments.
- Materials are readily available
- Large volume treatments give deep formation penetration.
- The shut-in time on the treated well is short, overnight.
- Low viscosity is necessary for ease of penetration.

Transmission Report

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BAKER BOTTS LLP

FAX MEMO

May 1, 2

VIA OVERNIGHT MAIL

Mr. Connally E. Mears, Director
Technical Enforcement Program (8ENF-T)
Office of Enforcement, Compliance, and Environmental Justice
U.S. Environmental Protection Agency
999 18th Street, Suite 300
Denver, CO 80202-2466

Re: Biere Well Site, East Poplar Oil Field: Response to EPA Comments on Proposed Monitoring Plan

Dear Mr. Mears:

Thank you for your March 28 comments on Pioneer's Proposed Monitoring Plan for the Shallow Groundwater. We agree with most of your comments and will make changes accordingly. With respect to a couple of your comments, we want to discuss further the best approach to pursue in view of technical feasibility and cost-effectiveness considerations. Pioneer's detailed responses to EPA's comments are set forth below.

Additional Monitoring Well Locations

Installation of Additional Wells

Pioneer agrees additional wells in the vicinity of the Biere well would assist in monitoring the effectiveness of the response action effort. Pioneer is negotiating a land agreement with the owner to allow unrestricted use of a drill pad site covering approximately 2 acres centered on the Biere well. Pioneer proposes to install 4 new wells at the perimeter of the 2 acre work area; one on each of the four sides (north, south, east and west). These wells will be installed shortly after implementation of the response action program, since the amount of equipment and intensity of effort required by the program would create an unacceptable risk of damage to any wells within the immediate area of the Biere well.

Replacement of PNR4

Pioneer believes that well PNR4 does not require replacement at this time. Well PNR4 was stoutly constructed and will be a valuable monitoring point to assess changes in the shallow Quaternary Aquifer following the response action program. Well PNR4 is within

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BAKER BOTTS LLP

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CO [illegible]
PH [illegible] FAX 303 312 6191

May 1, 2001

VIA OVERNIGHT MAIL

Mr. Connally E. Mears, Director
Technical Enforcement Program (8ENF-T)
Office of Enforcement, Compliance, and Environmental Justice
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999 18th Street, Suite 300
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Transmission Report

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Mr. Connally E. Mears
May 7, 2001
Page 2

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CO [illegible]
303-312-[illegible] 3033126191

__Specific Comments__

Paragraph 5: Pioneer does not own any equi[illegible] facilities at the site. Furthermore, Pioneer never used some of the equipment listed in this paragraph, such as oil/water separators. We suggest that the language read "Respondent previously operated oil and gas production facilities and associated equipment and units (including, but not limited to, the Biere 1-22 well) in portions of the East . . .".

Paragraph 8: It would be helpful to mention in the AOC that there are two separate aquifers in the study area, not just one within the Quaternary deposits. The area around the Biere well overlies the glacial till aquifer, while the City of Poplar wells access the alluvial aquifer. Note the presence of chlorinated solvents in the City of Poplar wells which clearly do not emanate from the Biere well. There is no data to support it, and therefore the AOC should avoid implying that Biere well releases have affected City wells.

Paragraph 11: Available data suggest that there may be a plume in the immediate area of the Biere well and a separate plume moving down the valley from sources to the north of the Biere site. The AOC should distinguish between these plumes, or at least reflect the fact that certain of the hits are not suspected to have been caused by releases from the Biere well.

Paragraph 12: The referenced data are from wells that have nothing to do with Pioneer, and thus the data can be deleted. If EPA feels these data constitute critical background information, the Agency should clarify that the data stem from wells unrelated to the Biere site.

Paragraphs 13, 15 and 16: The AOC should clarify that the Trotlier well – the "home site" referred to in this paragraph – is not being used as a source of drinking water. The risk figures cited in the AOC do not reflect the lack of any data showing benzene above MCLs in wells being used by residents for drinking.

Paragraph 24: The fact that there are hydrocarbons in PNR-4 does not mean that there is 40 feet of oil "floating on top of the ground water." There is only about 5 feet of permeable gravel in the Quaternary glacial aquifer at PNR-4, and the well only has 5 feet of well screen that is positioned at the very bottom of the Quaternary deposits. When PNR-4 was first installed traces of oil were noted, over time, small amounts of hydrocarbons in the area have migrated to the PNR-4 well, and due to density separation have displaced the water in the column.

Paragraph 31: There may be elevated temperatures at 3000-9000 feet. However, since there has been injection of hot brines from deep production wells across the oil field, it is quite possible that the source of the brine is the injected fluids from the shallower zones.

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TM: Terminated by user
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WS: Waiting Send

FROM: PIONEER-OPERATIONS FAX NO.: 99729693567 08-13-01 02:44A P.01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) Date: 8-15-01

Fax #: 303-312-6409 Pages: 8 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE #1-22B DAILY DRILLING REPORTS

COMMENTS:

NATHAN — DAILY DRILLING REPORTS - 8-14-01 & 8-15-01.
AT 10:00 AM (CST) WELL WAS STABILIZED & NOT FLOWING.
PREPARING TO RIH W/ CASING & CEMENT SAME.

WILBUR DOVER

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B		SURFACE	1

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	35	0	35

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
DRILL 17 1/2" HOLE.			

PUMP	MAKE & TYPE	LINER X STROKE	SPM
#1	EMSCO D-300	5.5 X 14	70
#2	N/A		

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN
1	17.5	HTC	1	RR	16	0

DP SIZE	O.D.	CONN	GRADE
	4 1/2	FH	E

DIRECTIONS TO THE DRILLING RIG: ONE MILE EAST OF POPLAR MT. ON HIGHWAY #2 TO BIA #75. THREE MILES NORTH ON BIA #75. ONE MILE EAST. 1/2 MILE NORTH AND EAST INTO LOCATION.

LOCATION: 1,984' FSL & 851' FWL, SEC.22, T28N-R51E, ROOSEVELT COUNTY, MONTANA.

ELEVATION: 2,074' GROUND LEVEL AND 2,083' KB.

TOOL PUSHERS: RON McCLEARY (406) 390-0085 & DAMON OWENS (406) 282-3881.

CONDUCT PRE SPUD MEETING ON LOCATION.

7:00 AM-20:00	Rig up Faith Drilling rig.
20:00-21:00	Begin drilling rathole.
21:00-21:30	Repair rig lights.
21:30-24:00	Complete drilling rathole.

WEATHER	SUPERVISOR	DATE
98 DEG. F	MURRAY BROOKS	8/14/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

24:00-24:15	Safety Meeting.
24:15-24:30	Prime lines, level Kelly.
24:30-1:30 AM	SPUD IN @ 12:30 AM, 8/14/01, Drill 17 1/2" hole.
1:30 AM-3:00	Mix mud, Gel: 27 sks, Cedar Fibre: 6 sks.
3:00-8:00	Drill 17 1/2" hole to 35' at 8:00 AM.
	Dowell on location at 11:00 PM, 8/13/01.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/14/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.	$2,000.00	$2,000.00
105	Mob/Demob	1/3 charged to each well.	$7,333.00	$7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$1,200.00	$1,200.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$1,800.00	$1,800.00
123	Cementing			
124	Directional			
146	DST & analysis			
128	Coring & analysis			
128	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water		$1,400.00	$1,400.00
135	Rentals	Trailer, water,toilets,trash	$225.00	$225.00
135	Rentals	BOP, Hydril, flanges	$800.00	$800.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$5,000.00	$5,000.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead		$4,700.00	$4,700.00
208-218	Surf. Facilities			
228	Overhead		$ 1,200.00	$ 1,200.00
865	Miscellaneous			
		TOTAL	$ 25,258.00	$ 25,258.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/14/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B		SURFACE	2

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	73' KB	0	73

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
CIRCULATE 17 1/2" HOLE	$2,685	$23,885	$49,793

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	PH	WL	CL	SAND	SOL	LIME	MBT	HTHP @ deg C
		10.1	70										

PUMP	MAKE @ TYPE	LINER X STROKE	SPM	M3/MIN	KPA	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	17.5	HTC	1	RR	16	0	73'		5	15		50	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	BOP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	CIRC HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
	4 1/2	FH	E			COND	BOP TEST
						SURF	
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
32'	1-8" DC & 4' SUB

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

REAL DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00 AM-8:00AM	Drill 17 1/2" hole.
8:00 AM-14:00	Mix Gel & Barite to contain water flow. Initial water flow estimated at 1-2 bbls./min.
14:00-17:30	Pickup 13 3/8" Guide shoe (0.50'). One 13 3/8" pup joint (12.80').
	one joint 13 3/8" casing (44.95') and one landing joint (45.46'). Run in to 59' KB.
17:30-20:00	Circulate and work casing in an attempt to get deeper, no success.
20:00-22:00	Pull & lay down Landing joint, stand back full joint w/pup joint in derrick.
22:00-23:00	Pickup 17 1/2" bit, X-over sub and one 8" DC.
23:00-3:30 AM	Mix Gel (45 sks.), Cedar Fiber (8 sks.), Extendex (1) & Barite (70 sks.) in 200 bbl.
	mud tank.
3:30-6:00 AM	Circulate and clean hole.
	Bariod will send Engineer to perform mud check today.
	HB&R set up transfer pump and moved 800 bbls. 180 degree, high chloride water
	into on site Frac.tanks. Also have 1,000 bbls. fresh water in Frac tanks on loc.
	NEED TO GET CASING CEMENTED IN PLACE. LARGE WASHOUT UNDER RIG.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/15/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Dowell Trucks on location, crew returned to Williston at 8:00 pm, 8/14/01.
Will chip cement out of 13 3/8" guide shoe and notch bottom of shoe.
Had drill 20' of hard fill (boulders) to cleanout to TD.
All 13 3/8", 9 5/8", 5 1/2", 2 7/8" and wellheads are on location.

A phone message was left with the MBOGC office in Billings as notification for an 8:00 PM, spud in of the Biere 1-22B on 8/13/01.

Bob Schmidt, field supervisor for MBOGC was notified of Rig move in 8/11/01.
Mr. Schmidt was on site 8/13/01.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/15/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$2,000.00
105	Mob/Demob	1/3 charged to each well.		$7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$7,150.00	$8,350.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		$ 1,500.00	$ 1,500.00
114	Mud,Chem.Comp. Fluids		$ 2,685.00	$ 2,685.00
115,117,119,145	Casing		$ 1,350.00	$ 1,350.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$2,000.00	$3,800.00
123	Cementing		$ 4,500.00	$ 4,500.00
124	Directional			
148	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water		$1,400.00	$2,800.00
135	Rentals	Trailer, water,toilets,trash	$225.00	$450.00
135	Rentals	BOP, Hydril, flanges	$600.00	$1,200.00
135	Rentals	Frac Tanks & Pump	$650.00	$ 1,300.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$675.00	$5,675.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$4,700.00
208-218	Surf. Facilities			
229	Overhead		$ 1,150.00	$ 2,350.00
865	Miscellaneous			
		TOTAL	$ 23,885.00	$ 49,793.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/15/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) - DENVER Date: 8-16-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE #1-22B - DAILY DRILLING REPORT

COMMENTS:

NATHAN - I WILL E-MAIL YOU ~~OF~~ AN UPDATE THIS AFTERNOON.

WILBUR DOVER

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	71' KB	SURFACE	3

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	73' KB	0	73

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
WAIT FOR DOWELL TO DELIVER CM	$8,185	$41,895	$91,888

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	PH	WL	CL	SAND	SOL	CAL	MBT	HTHP @ deg C
		10.6	65			7							

PUMP	MAKE & TYPE	LINER & STROKE	SPM	M3 MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	17.5	HTC	1	RR	18	0	73'		5	15		50	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
	4 1/2	FH	E			SURF	BHA INSP
						INT	SHOE TEST
						PROD	SCP

BHA LENGTH	DESCRIPTION
32'	1-6" DC & 4' SUB

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6;00 AM-8:00AM	Mix Mud, circulate hole.
8:00 AM-10:00	Pickup 13 3/8" Guide shoe (0.50'), One 13 3/8" pup joint (12.60'),
	one joint 13 3/8" casing (44.95') and one landing joint (45.46'). Run in to 72' KB.
	Shoe depth landed @ 82' below GL.
10:00:-11:00	Rig Schlumberger/Dowell, mix & pump 330 cu.ft. @ 16.0#/gal
11:00-19:30	WOC, monitor water flow, Flow continues @ an estimated 2 BPM,
19:30-20:15	Pickup & run 60' of 1" pipe. Run in beside 13 3/8" casing. Cement as follows:
	A) Mix & pump 18 bbls. 16#/gal. Slurry w/3.5% Calcium chloride.
	B) Mix & pump 9 bbls. 17.5#/gal. Densified Cement w/3.0% Calcium chloride.
	C) Mix & pump 11 bbls. 16#/gal. Slurry w/5.0% Calcium chloride.
	D) Mix & pump 11 bbls. 16#/gal. Slurry w/6.0% Calcium chloride.
	Pumping rates @ 3 bpm. total of 350 sks. cement pumped.
	Samples of Densified Cement set up on surface in 10 min.
	Samples of Cement w/ 3 1/2-6.0% Calcium chloride would not pour in 15 min.
	Order 700 sks.Densified Cement and 125' of 2" line pipe.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/16/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

	Mix 200 bbl. Mud tank w/33 sks. gel, 65 sks. Barite. MW: 10.8#/gal w/65 Vis.
	Haul 490 bbls. of 34,000 ppm water to Approved Disposal Site.
	Have 600 bbls. Fresh water on location.
	There is 1050 bbls of produced water in Frac tanks.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/16/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$2,000.00
105	Mob/Demob	1/3 charged to each well.		$7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$7,150.00	$15,500.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp, Fluids		$ 5,500.00	$ 8,185.00
115,117,119,145	Casing			$ 1,350.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$1,500.00	$5,100.00
123	Cementing		$ 23,600.00	$ 28,100.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$2,800.00
135	Rentals	Trailer, water,toilets,trash	$225.00	$875.00
135	Rentals	BOP, Hydril, flanges	$600.00	$1,800.00
135	Rentals	Frac Tanks & Pump	$650.00	$ 1,950.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$875.00	$6,350.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
208	Wellhead			$4,700.00
208-218	Surf. Facilities			
229	Overhead		$ 1,995.00	$ 4,345.00
885	Miscellaneous			
		TOTAL	$ 41,695.00	$ 91,888.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/18/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA)-DENVER Date: 8-17-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE #1-22B - DAILY DRILLING REPORT

COMMENTS:

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	71' KB	SURFACE	4

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	73' KB	0	73

OPERATION @ 0800	CUM MUD COST	DAILY COST	CUM WELL COST
	$1,200	$51,975	$142,188

MUD DATA	WT	VIS	PV/YP	GELS	PH	WL	CK	SAND	SOL	OIL	MBT	HTHP @ deg C
FLOWLINE	10.6	65			7							

PUMP	MAKE & TYPE	LINER X STROKE	SPM	BBL/MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON BIT	RPM	CONDITION
1	17.5	HTC	1	RR	16	0	73'		5	15		50	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DAILY HRS	CUM ROT HRS

DP & JTS	O.D.	CONN	GRADE	WT / METER	LENGTH	COND	BOP TEST
	4 1/2	FH	E			SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
32'	1-6" DC & 4' SUB

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

GAS DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

8:00 AM-9:00AM	Wait for Schlumberger to deliver Densified Cement. Run in 50' of 2" line pipe.
9:00 AM-10:00	Rig Schlumberger/Dowell. Held Safety meeting.
10:00-10:45	Mix and pump 70 bbls. Densified cement @ 17.5#/gal w/3% calcium chloride.
	Pumped at average of 5 bpm. Stop pumping, water flow started immediately.
10:45-11:00	Prep to pump Densified Cement w/6% calcium chloride.
11:00-11:15	Mix & pump 29 bbls. Water flow continues immediately after pump shuts down.
11:15-12:00	Discuss next step.
12:00-12:45	A) Mix & pump 18 bbls. 17#/gal. slurry w/3.0% Calcium chloride at 5 bpm..
	C) Slow rate to 1.0 bpm for next 20 bbls. slurry.
	Pumped total of 750 sks. Densified cement w/3% calcium chloride.
12:45-20:00	Wait on second loads of 750 sks. cement to be delivered.
20:00-22:00	Place 60' of 1" pipe beside 13 3/8" casing, tie in Dowell. Btm.@ 48'.
	Place 50' of 2" pipe parallel to 13 3/8" csg. Water flows from 2". Btm.@ 38'.

WEATHER	SUPERVISOR	DATE
90 Deg. F	MURRAY BROOKS	8/17/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$2,000.00
105	Mob/Demob	1/3 charged to each well.		$7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$7,150.00	$22,650.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp. Fluids		$ 1,200.00	$ 8,385.00
115,117,118,145	Casing			$ 1,350.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$1,500.00	$8,600.00
123	Cementing		$ 36,000.00	$ 64,100.00
124	Directional			
148	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water		$1,500.00	$4,300.00
135	Rentals	Trailer, water,toilets,trash	$225.00	$875.00
135	Rentals	BOP, Hydril, flanges	$600.00	$1,800.00
135	Rentals	Frac Tanks & Pump	$850.00	$ 1,850.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$675.00	$7,025.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$4,700.00
208-218	Surf. Facilities			
229	Overhead		$ 2,475.00	$ 8,820.00
865	Miscellaneous			
		TOTAL	$ 51,675.00	$ 142,186.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/16/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

page 2

22:00-22:15	Rig Schlumberger. Hold Safety meeting.
22:15-22:30	Pump 200 sks. Densified cement w/3% calcium chloride down 1" line pipe.
	During cementing operation, water flow was 40 bbl./hr. Allow water to continue to flow.
	Appear to have cement cover from 30' (est.) to surface.
22:30-5:00 AM	Rig Schlumberger. Hold Safety meeting. Pump 100 sks. Densified cement down 2" line
	pipe. Cement begins to flow out of Rathole. Shut in.
	Well now flowing water @ 40 bph from the Rathole.
5:00-6:00	WOC.
	Haul 300 bbls. of 34,000 ppm water to Approved Disposal Site.
	Have 1,400 bbls. fresh water on location.
	There is 1500 bbls of produced water in Frac tanks.
	Added 2 more Frac tanks.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/17/01

PIONEER
NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: Nathan Wiser (EPA) - Denver
Date: 8-~~18~~ 20-01
Fax #: 303-312-6409
Pages: ~~X~~ 7, including this cover sheet.
From: Wilbur Dover

Subject: Biere #1-22B - Daily Drilling Report

COMMENTS:

Nathan: Daily drilling reports for 8-18 & 19-01.

Wilbur Dover

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	71' KB	SURFACE	5

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	73' KB	0	73

OPERATION @ 6:00	CUM MUD COST	DAILY COST	CUM WELL COST
	$9,385	$20,885	$169,503

MUD DATA	PIT	WT	VIS	PV/YP	GELS	PH	WL	CAL	SAND	SOL	OIL	MBT	HTHP @ deg C
	FLOWLINE	10.6	65			7							

PUMP	MAKE & TYPE	LINER X STROKE	SPM	BBL/MIN	PSI	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
1	EMSCO D-300	5.5 X 14	70						
2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	FOOTAGE	HOURS	ROP	WT ON BIT	RPM	CONDITION
1	17.5	HTC	1	RR	18	0	73'		5	15		50	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT/METER	LENGTH		
	4 1/2	FH	E			COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MAOP

BHA LENGTH	DESCRIPTION
32'	1-8" DC & 4' SUB

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

GAS DEPTHS	BGG	CG	MUD WT	CHLORIDES	GAS ANALYSIS

6:00 AM-10:00AM	WOC
10:00 AM-13:00	Jackhammer cement out of cellar to accommodate BOE.
13:00-15:00	Cut off 13 3/8" landing jt., weld on 13 3/8" collar to casing. The 2" line pipe,
	running parallel to the 13 3/8" begins to flow hot water after remaining static.
15:00-18:00	Weld on 13 3/8" collar to casing.
18:00-18:15	Rig Schlumberger, conduct Safety Mtg. **Mix & pump 1bbl. Cement down 2" pipe.
18:15-5:00 AM	Install Hydril, flow nipple & cutoff 2" line pipe, weld cap on 2", weld flo nipple.
5:00-5:30 AM	Try to pull Kelly from Kelly sock, pump on kelly, no success. Kelly cemented in.
5:30-6:00 AM	Rig Schlumberger, conduct Safety Mtg.
	Run 40' of 1" pipe down the outside of the rathole. Mix & pump 6 bbls. cement
	down 1" pipe.
	**Note: When 1 bbl. Cement was pumped down the 2" line pipe, 40 bbl./hr. water
	flow quit coming up the outside of the kelly sock.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/18/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Haul 660 bbls. of 34,000 ppm water to Approved Disposal Site.
Have 800 bbls. fresh water on location.
There is 1185 bbls of produced water in Frac tanks.

Dana Buckles with Environmental Health and Safety visited the lease to investigate a report that we were discharging "yellow stuff". He was on location 8/18/01.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/18/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.	$ 115.00	$ 2,115.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 29,800.00
108	Drilling Motorage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp. Fluids			$ 8,385.00
115,117,119,145	Casing			$ 1,350.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$1,800.00	$8,400.00
123	Cementing		$ 8,350.00	$ 79,950.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 4,300.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 900.00
135	Rentals	BOP. Hydril, flanges	$ 600.00	$ 2,400.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 2,700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 7,700.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 4,700.00
208-218	Surf. Facilities			
229	Overhead		$ 1,000.00	$ 6,970.00
885	Miscellaneous			
		TOTAL	$ 20,865.00	$ 169,803.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/18/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	71' KB	SURFACE	8

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	73' KB	0	73

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
	$10,350	$15,540	$186,043

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	PH	WL	CL	SAND	SOL	OIL	MBT	BHT @ deg C
	FLOWLINE	10.4	45			7							

PUMP	MAKE & TYPE	LINER X STROKE	SPM	
#1	EMSCO D-300	5.5 X 14	70	
#2	N/A			

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
2	12.25	HTC	HP11J	EB2482	14	73'			0	0		0	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	HOP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP & HWDP	O.D.	CONN	GRADE	WT / METER	LENGTH	CSG	BOP TEST
	4 1/2	FH	E			SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
32'	1-6" DC & 4' SUB

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00 AM-6:30AM	Rig down Schlumberger. Order 3.5 Power Swivel. Pickup 12 1/4" bit & 2-DC's.
6:30 AM-14:00	Wait for Power Swivel. Call Weatherford to provide Operator for Swivel.
14:00-15:00	Rig Swivel, call for 2-7/8" cables, a second Stiff Arm, Turnbuckles & 2" fittings.
15:00-21:00	Wait for Equipment.
21:00-3:00 AM	Rig up equipment.
3:00-3:30	Drill out 2' of cement, cleanout 5' of fill, well flows water. Shut in.
	Call Schlumberger and Baker.
3:30-6:00 AM	Mix mud and wait for Services to arrive.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/18/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Haul 750 bbls. of 34,000 ppm water to Approved Disposal Site.
Have 750 bbls. fresh water on location.
There is 400 bbls of produced water in Frac tanks.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/18/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$ 2,115.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 38,950.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		$ 1,500.00	$ 3,000.00
114	Mud,Chem,Comp. Fluids		$ 1,000.00	$ 10,385.00
115,117,119,145	Casing			$ 1,350.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$1,050.00	$9,450.00
123	Cementing			$ 79,950.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 4,300.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 1,125.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 3,000.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 3,450.00
135	Rentals	Power Swivel	$ 1,000.00	1000
122	Contract serv.	Swivel Operator	$ 850.00	850
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 8,375.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead		$740.00	$ 5,440.00
208-218	Surf. Facilities			
229	Overhead			$ 6,970.00
885	Miscellaneous			
		TOTAL	$ 16,540.00	$ 185,043.00

WELL NAME	SUPERVISOR	DATE
Pioneer Blore #1-22B	Murray Brooks	8/19/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) - DENVER Date: 8-~~18~~ 20-01

Fax #: 303-312-6409 Pages: 4, including this cover sheet.

From: WILBUR DOVER

Subject: BIERE #1-22B - DAILY DRILLING REPORT

COMMENTS:

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	71' KB	SURFACE	7

CONTRACTOR	DEPTH TODAY/TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	73' KB	0	73

OPERATION @ 6:00	CUM MUD COST	DAILY COST	CUM WELL COST
Drill out cement.	$10,350	$21,160	$207,783

MUD DATA	WT		VIS	PV/YP	GELS	PH	WL	CHL	SAND	SOL	OIL	MBT	WTMP @
FLOWLINE		9	28			7							

PUMP	MAKE & TYPE	LINER X STROKE	SPM	BD MIN	KPA	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
2	12.25	HTC	HP11J	EB2482	14	73'			0	0		0	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT/METER	LENGTH	CSG	BOP TEST
	4 1/2	FH	E			SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
32'	1-8" DC & 4' SUB

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00 AM-9:00AM	Lay down Power Swivel, set back collars.
9:00 AM-11:00AM	Pickup Baker 7" Inflatable Packer, run in on one joint of 4 1/2" DP. Set @ 32' KB.
11:00-12:00PM	Hook up Schlumberger, try to inflate packer, no success, POOH.
	Replace setting valve in Packer & run in hole, pressure up, would not set POOH.
12:00-18:00PM	Wait on Packer.
18:00-19:30PM	Run 7" inflatable Packer, set same, put 250 psi on backside, pump 17.5#/gal.
	cement w/3% calcium chloride. Pumped 350 sks. (76 bbls.slurry) @ 4 bpm, slow
	to 1.5 bbl./min for last 5 bbls. Displace w/3.0 bbls. Fresh water.
19:30-2:30 AM	WOC. Rig Power Swivel to stand in Derrick. Lay down cutoff Kelly.
2:30-3:00AM	Pull 7" Inflatable Packer. Tag cement @ 38'.
3:00-5:00AM	Pickup collars, break bit sub, Float would not fit in sub, trip in w/bit, bit sub, 1-DC.
5:00-6:00AM	Pickup power swivel, prep to drill cement.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/20/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Haul 150 bbls. of 34,000 ppm water to Approved Disposal Site. Cum to Date: 2,350 bbls.
Have 500 bbls. fresh water on location.
There is 800 bbls of produced water in Frac tanks.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/20/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.	$ 750.00	$ 2,885.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 44,100.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 3,000.00
114	Mud,Chem,Comp. Fluids			$ 10,365.00
115,117,118,145	Casing			$ 1,350.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$500.00	$9,950.00
123	Cementing		$ 7,650.00	$ 87,800.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 4,300.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 1,350.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 3,600.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 4,200.00
135	Rentals	Power Swivel	$ 1,000.00	$ 2,000.00
122	Contract serv.	Swivel Operator	$ 850.00	$ 1,700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 9,050.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
208	Wellhead			$ 5,440.00
208-218	Surf. Facilities			
229	Overhead		$ 1,000.00	$ 9,580.00
885	Miscellaneous			
		TOTAL	$ 21,150.00	$ 207,783.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/20/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-21-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

FROM: PIONEER-OPERATIONS FAX NO.: 99729693567 08-19-01 01:07A P.02

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	71' KB	SURFACE	8

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	258' KB	71' KB	187'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Run 9 5/8" casing.	$13,750	$20,880	$227,850

MUD DATA	PIT	WT	VIS	PV/YP	GELS	PH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
	FLOWLINE	9.5	42	6	[illegible]	13		43000					

PUMP	MAKE & TYPE	LINER X STROKE	SPM	AV-ANN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
1	EMSCO D-300	5.5 X 14	70						
2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
2	12.25	HTC	HP11J	EB2482	14	73'	258	187	14	13	10	120	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	ECD	FRAC GRAD	ROP IN SHALE

TORQUE	ROT WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP & HWDP	O.D.	CONN	GRADE	WT / METER	LENGTH	COND	BOP TEST
	4 1/2	FH	E			MUD	BHA WSP
						BIT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
32'	1-8" DC & 4' SUB

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

GAS DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00 AM-7:30AM	Drill cement from 38' to 65'.
7:30 AM-10:00AM	Rearrange power swivel lines.
10:00-20:30PM	Drill 12 1/4" hole to 258' KB. Mix mud.
20:30-21:00	Circulate hole.
21:00-21:30	Survey @ 240', one degree.
21:30-23:30	Pull out of hole.
23:30-1:00 AM	Rig to run casing.
1:00-3:00 AM	Baker-loc 9 5/8" guide shoe, run joint #1.
3:00-3:45	Run joint #2.
3:45-4:15	Run joint #3.
4:15-5:26	Run joint #4.
5:26-6:00	Run joint #5.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/21/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Haul 320 bbls. of 44,000 ppm water to Approved Disposal Site. Cum to Date: 2,870 bbls.
Have 1,500 bbls. fresh water on location.
There is 1100 bbls of produced water in Frac tanks.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/21/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.	$ 750.00	$ 2,885.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 51,250.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 3,000.00
114	Mud,Chem,Comp. Fluids		$ 3,331.00	$ 13,750.00
115,117,118,145	Casing		$ 3,700.00	$ 5,050.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$1,200.00	$11,150.00
123	Cementing			$ 87,800.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water		$ 500.00	$ 4,800.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 1,575.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 4,200.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 4,950.00
135	Rentals	Power Swivel	$ 1,000.00	$ 3,000.00
122	Contract serv.	Swivel Operator		$ 1,700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 9,725.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 5,440.00
208-218	Surf. Facilities			
229	Overhead		$ 1,000.00	$ 10,560.00
865	Miscellaneous			
		TOTAL	$ 20,881.00	$ 227,948.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/21/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3740
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-22-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

NATHAN: Biere daily drilling reports.
WE WILL RUN THE CBL (CEMENT BOND LOG) TODAY.
I ~~READ~~ GOT YOUR FAX COPY OF THE PRESS RELEASE.
THANKS,
WILBUR DOVER

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	240' KB	SURFACE	9

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	258' KB	258' KB	0

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Nipple up 9 5/8" casing.	$22,179	$73,488	$287,740

MUD DATA	PIT	WT	VIS	PV/YP	GELS	PH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
	FLOWLINE	9.5	42	8	###	13		43000					

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPA	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
2	12.25	HTC	HP11J	EB2482	14	73'	258	187	14	13	10	120	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	CONN	SH DEN	FPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH	COND	BOP TEST
	4 1/2	FH	E			SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
32'	1-6" DC & 4' SUB

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

LEAK DEPTHS	POP	EMW	MUD WT	CHLORIDES	PAD ANALYSIS

6:00 AM-12:00PM	Circulate 9 5/8" casing down to 240' KB. Mix gel sweeps.
12:00 -15:00 PM	Circulate casing. Conduct safety meeting w/Schlumberger & Rig crew.
15:00-15:30PM	Mix & Pump 350 sks. of Class G w/2% calcium chloride. Total of 75 bbls.
	Circulate out 35 bbls. of cement to pit. Shut in as water flow begins at a 5-10 bph.
	rate.
15:30-18:30	WOC.
18:30-20:00	Tie Schlumberger into 2" valve on 13 3/8" casing & pump 200 sks. Class G (40 bbls.)
	3% calcium chloride down the 9 5/8" by 13 3/8" annulus. Pressure @ 50 psi.
	Displace w/3 bbls. Fresh water and shut in.
20:00-4:00 AM	WOC.& begin nipple down. Clean mud tanks & fill with produced water.
4:00-6:00 AM	Remove 9 5/8" landing joint. Continue to nipple down.
	CALC TOC +/- 15'
	****Please note: Today's cement costs include $28,141.00 for 2,000 sks. 50-50 poz.
	delivered to location.
	Had 750 sks. Bariod Zeogel delivered.

WEATHER	SUPERVISOR	DATE
90 Deg. F	MURRAY BROOKS	8/22/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Haul 780 bbls. of 44,000 ppm water to Approved Disposal Site. Cum to Date: 3,450 bbls.
Have 500 bbls. fresh water on location.
There is 820 bbls of produced water in Frac tanks.

Power Swivel charge @ 500.00/day standby only.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/22/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$ 2,885.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 58,400.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 3,000.00
114	Mud,Chem,Comp. Fluids		$ 8,429.00	$ 22,179.00
115,117,119.145	Casing		$ 3,700.00	$ 5,050.00
200	Tubing			
120	Float equipment		$ 1,059.00	$ 1,059.00
122	Contract serv. & hauling		$1,200.00	$12,350.00
123	Cementing		$ 43,816.00	$ 131,215.00
124	Directional			
148	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal		$ 525.00	$ 525.00
147	Water			$ 4,800.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 1,800.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 4,800.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 5,700.00
135	Rentals	Power Swivel	$ 500.00	$ 3,500.00
122	Contract serv.	Swivel Operator		$ 1,700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 10,400.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead		$1,585.00	$ 7,025.00
208-218	Surf. Facilities			
229	Overhead		$ 3,475.00	$ 14,035.00
665	Miscellaneous			
		TOTAL	$ 73,488.00	$ 297,736.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/22/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-23-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

NATHAN - CBL SHOWS GOOD BOND. DRILLING AHEAD WITH NO PROBLEMS @ 8:00 AM TODAY.

WILBUR DOVER

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	240' KB	SURFACE	10

CONTRACTOR	DEPTH TODAY/TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	374'	258' KB	118'

OPERATION @ 0800	CUM MUD COST	DAILY COST	CUM WELL COST
Drill 8 3/4" hole.	$25,445	$20,730	$318,500

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	PH	WL	CHL	SAND	SOL	ESL	MBT	HTHP @ deg C
		8.8	28					43000					

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON BIT	RPM	CONDITION
3	8 3/4	HTC	GT-1	53550	16	258		118'	9.25	12	20	100	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP & HWDP	O.D.	CONN	GRADE	WT / METER	LENGTH	CSG	TESTS
	4 1/2	FH	E			COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
240.29'	Bit, Bit sub, 8-DC's & X-over.

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

GAS DEPTHS	BGG	CG	MAX WT	CHLORIDES	GAS ANALYSIS

6:00 AM-14:00PM	Nipple down, install 9 5/8" wellhead and nipple up.
14:00-15:00	Rig Schlumberger Wireline, run CBL from 187' to 40', rig down. Good bond.
15:00-17:15PM	Complete nipple up.
17:15-18:15	Pickup bit, bit sub, DC's.
18:15-20:45	Test BOE to 500 psi, repair leaks.
20:45-23:00	Drill shoe joint & shoe.
23:00-6:00 AM	Drill 8 3/4" hole.

WEATHER	SUPERVISOR	DATE
90 Deg. F	MURRAY BROOKS	8/23/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Haul 795 bbls. of 44,000 ppm water to Approved Disposal Site. Cum to Date: 4,245 bbls.
Have 1,500 bbls. fresh water on location.
There is 220 bbls of produced water in Frac tanks.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/23/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$ 2,865.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 85,550.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 3,000.00
114	Mud,Chem,Comp. Fluids		$ 3,266.00	$ 25,445.00
115,117,119,145	Casing			$ 5,050.00
200	Tubing			
120	Float equipment			$ 1,058.00
122	Contract serv. & hauling		$1,600.00	$13,950.00
123	Cementing			$ 131,215.00
124	Directional			
148	DST & analysis			
128	Coring & analysis			
128	Logging & perforating		$ 3,815.00	$ 3,815.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			$ 525.00
147	Water		$ 850.00	$ 5,450.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 2,025.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 5,400.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 6,450.00
135	Rentals	Power Swivel	$ 1,000.00	$ 4,600.00
122	Contract serv.	Swivel Operator		$ 1,700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 11,075.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
208	Wellhead			$ 7,025.00
208-218	Surf. Facilities			
229	Overhead		$ 1,000.00	$ 15,035.00
865	Miscellaneous			
		TOTAL	$ 20,731.00	$ 318,487.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/23/01

PIONEER
NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-24-01

Fax #: 303-312-6409 Pages: 5, including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

NATHAN - PREPARING TO RUN 5 1/2" CASING. NO WATER FLOW. HOLE IS IN GOOD SHAPE.

WILBUR DOVER

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	240' KB	SURFACE	11

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	697' KB	374' KB	323'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Lay down DP & DC's.	$25,446	$12,850	$331,317

MUD DATA	PIT / FLOWLINE	WT	VIS
		8.8	47

PUMP	MAKE & TYPE	LINER X STROKE	SPM
#1	EMSCO D-300	5.5 X 14	70
#2	N/A		

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
3	8 3/4	HTC	GT-1	53550	16	250	697'	439	13.25	##	20	100	

DP & HWDP	O.D.	CONN	GRADE
	4 1/2	FH	E

BHA LENGTH	DESCRIPTION
240.29'	Bit, Bit sub, 8-DC's & X-over.

6:00 AM-15:00PM	Work on pump, clean mud tanks.
15:00-18:45	Drill from 374' to 490'.
18:45-19:30PM	Survey @ 459', 1/2 degree. Repair power swivel hydraulic lines.
19:30-1:00 AM	Drill from 490' to 697'.
1:00-1:30	Circulate hole.
1:30-2:30	Lay down swivel.
2:30-5:30	Short trip to casing shoe, run back to bottom, no fill.
5:30-6:00	Lay down swivel. POOH laying down DP & DC's.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/24/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Haul 300 bbls. of 44,000 ppm water to Approved Disposal Site. Cum to Date: 4,545 bbls.
Have 800 bbls. fresh water on location.
There is 0 bbls of produced water in Frac tanks.

Will dredge pit and steel tank inside of pit today.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/24/01

FROM: PIONEER-OPERATIONS FAX NO.: 99729693567 08-22-01 12:05A P.04 P.03

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$ 2,865.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 72,700.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 3,000.00
114	Mud,Chem,Comp. Fluids			$ 25,445.00
115,117,118,145	Casing			$ 5,050.00
200	Tubing			
120	Float equipment			$ 1,059.00
122	Contract serv. & hauling		$1,200.00	$15,150.00
123	Cementing			$ 131,215.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
128	Logging & perforating			$ 3,815.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			$ 525.00
147	Water		$ 650.00	$ 6,100.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 2,250.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 6,000.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 7,200.00
135	Rentals	Power Swivel	$ 1,000.00	$ 5,500.00
122	Contract serv.	Swivel Operator		$ 1,700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 11,750.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 7,025.00
208-218	Surf. Facilities			
229	Overhead		$ 600.00	$ 15,635.00
885	Miscellaneous			
		TOTAL	$ 12,850.00	$ 331,317.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/24/01

Output DLIS Files

DEFAULT	DSLT_013PUP	FN:12	PRODUCER	22-Aug-2001 16:16	187.5 FT	34.5 FT

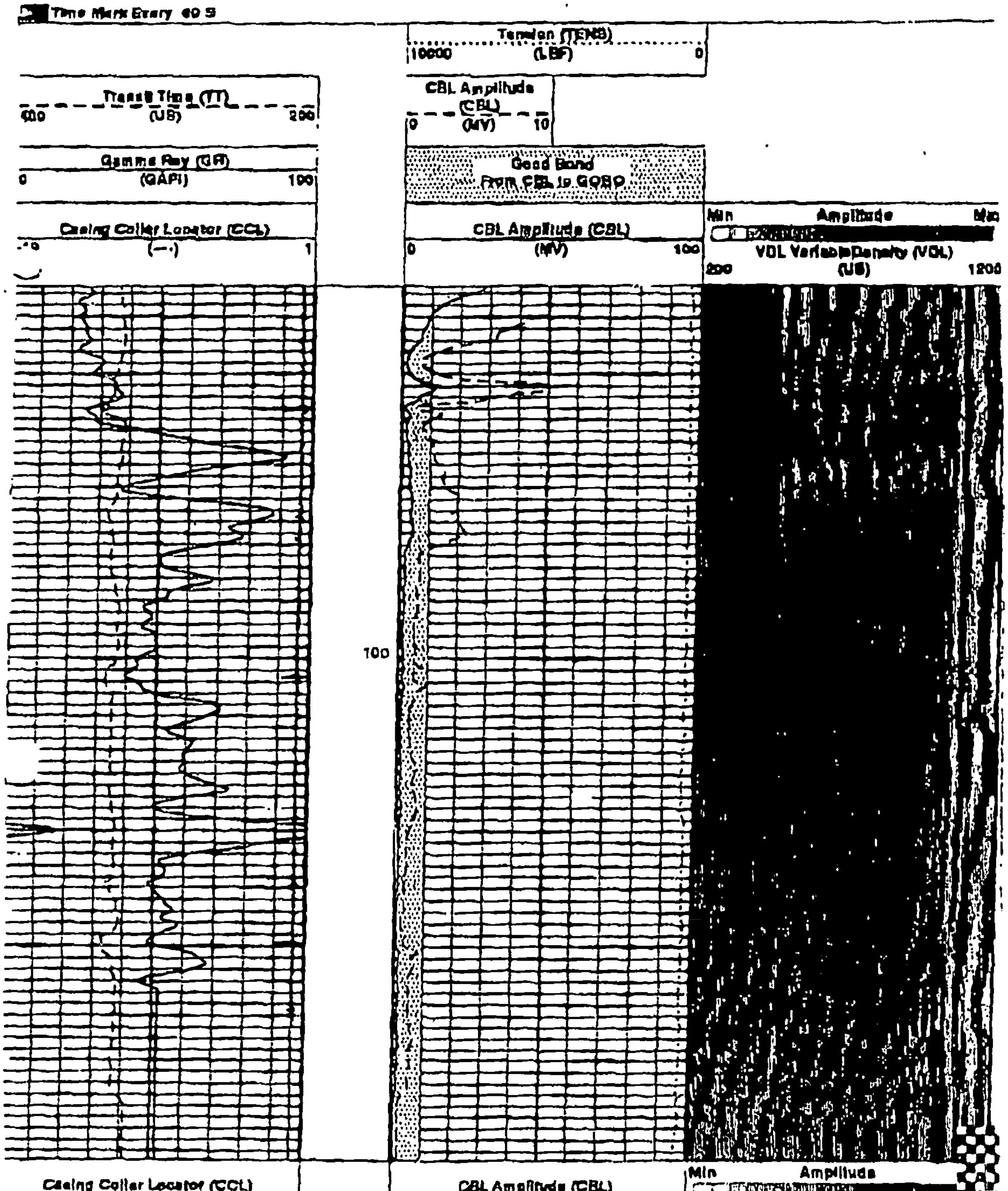
OP System Version: 9C2-303

MCM

DSLT-FTB	OP92-KP2	CAL-Y	OP92-KP2
SGT-N	OP92-KP2	DTC-H	9C2-303

PIP SUMMARY

Time Mark Every 60 S



FROM: PIONEER-OPERATIONS FAX NO.: 99729693567 08-25-01 01:25A P.01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-27-01

Fax #: 303-312-6409 Pages: 13, including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

NATHAN: REPORTS FOR FRIDAY, SAT & SUNDAY.
CURRENT OPERATIONS - MOVING RIG TO BIERE 1-22C.

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	666'	Base of Bearpaw shale.	12

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	697' KB	697' KB	0

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Begin to nipple up.	$25,445	$30,327	$361,644

MUD DATA	PIT	WT	VIS	PV/YP	GELS	PH	WL	CAKE	SAND	SOL	OIL	MBT	HTHP
	FLOWLINE	8.8	47										

PUMP	MAKE & TYPE	LINER X STROKE	SPM	HSI/BIT	BPS	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT	RPM	CONDITION
3	8 3/4	HTC	GT-1	53550	16	258	697'	439	13.25	##	20	100	
4	4.75	VAR	L2	807061	OPEN	697'							

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	ORC	SH DEN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP & JTS	O.D.	CONN	GRADE	WT / METER	LENGTH	COND	BOP TEST
						SURF	BHA INSP
						INT	CHOKE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

GAS DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00 AM-8:00AM	POOH laying down DP & DC's.
8:00-12:00	Run 697' of 5 1/2" Guide shoe & 18 jts. of casing. Circulate & reciprocate same.
12:00-13:30PM	Rig Schlumberger, conduct safety meeting, pump 250 sks. Class G cement.
	See Cementing report.
13:30-17:30	WOC.
17:30-6:00AM	WOC.
	****AS OF 6:00AM, 8/25/01, THE SURFACE SAMPLE OF CEMENT HAS NOT HARDENED.
	Dredge solids from pit w/backhoe.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/25/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.	$ 950.00	$ 3,815.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 79,850.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 3,000.00
114	Mud,Chem,Comp. Fluids			$ 25,445.00
115,117,119,145	Casing		$ 5,075.00	$ 10,125.00
200	Tubing			
120	Float equipment		$ 1,120.00	$ 2,179.00
122	Contract serv. & hauling		$500.00	$15,850.00
123	Cementing		$ 10,187.00	$ 141,402.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
128	Logging & perforating			$ 3,815.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			$ 525.00
147	Water		$ 650.00	$ 8,750.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 2,475.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 6,600.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 7,850.00
135	Rentals	Power Swivel	$ 1,000.00	$ 6,500.00
122	Contract serv.	Swivel Operator		$ 1,700.00
136	Safety & Environment			
137	Geol, Supervision			
138	Site Supervision		$ 875.00	$ 12,425.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 7,025.00
208-218	Surf. Facilities			
229	Overhead		$ 1,445.00	$ 17,080.00
885	Miscellaneous			
		TOTAL	$ 30,327.00	$ 381,644.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/25/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

Haul 0 bbls. of 44,000 ppm water to Approved Disposal Site. Cum to Date: 4,545 bbls.
Have 500 bbls. fresh water on location.
There is 0 bbls of produced water in Frac tanks.

Rig Downtime: 8/23/01, was 3:30 AM to 15:00 hrs. or 11.5 hrs.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/25/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	686' GL	Judith River	13

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	697' KB	697' KB	32'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Run 5 1/2" Baker Packer on 2 7/8" tbg.	$25,445	$15,815	$377,459

MUD DATA	FLOWLINE	WT	VIS	PV/YP	GELS	PH	WL	CAL	SAND	SOL	OIL	MBT	HTHP @ deg C
		8.8	30										

PUMP	MAKE @ TYPE	LINER X STROKE	SPM	M3/MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BIT #	SIZE	MAKE	TYPE	SER NO	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT	RPM	CONDITION
3	8 3/4	HTC	GT-1	53550	16	258	697'	439	13.25	##	20	100	
4	4.75	VAR	L2	807081	OPEN	697'	729'	32'	1.5		3		

MUD LOG DATA	DEPTH	MUD WT	ECD	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

CSG	O.D.	CONN	GRADE	WT/METER	LENGTH	CSNG	BOP TEST
						SURF	ANN BOP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00 AM-13:00PM	Nipple up.
13:00-14:00	Rig Schlumberger, conduct safety meeting, run GR,CCL & CBL, rig down.
14:00-18:00	Pickup bit, bit sub, 4-3 1/2" DC's and 2 7/8" tubing run same to cement @ 635'.
18:00-19:00	Pickup Power Swivel. Order out X-over from Swivel to Tubing.
19:00-20:30	Pressure test casing & BOE to 750 psi, held 15 minutes.
20:30-21:30	Wait on X-over from 3 1/2" IF to 2 7/8" EUE.
21:30-2:45 AM	Drill cement & shoe.
2:45-4:00 AM	Drill 4 3/4" hole to 729' KB.
4:00-4:15	Circulate Vis pill.
4:15-4:45	Stand back power swivel.
4:45-6:00	POOH. Baker on location w/Packer.

WEATHER	SUPERVISOR	DATE
80 Deg. F	MURRAY BROOKS	8/26/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

Haul 0 bbls. of 44,000 ppm water to Approved Disposal Site. Cum to Date: 4,545 bbls.
Have 1,500 bbls. fresh water on location.
There is 0 bbls of produced water in Frac tanks.

WELL NAME	SUPERVISOR	DATE
PIONEER BIERE 1-22B	MURRAY BROOKS	8/26/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$ 3,815.00
105	Mob/Demob	1/3 changed to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 87,000.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		$ 700.00	$ 3,700.00
114	Mud,Chem,Comp. Fluids			$ 25,445.00
115,117,119,145	Casing			$ 10,125.00
200	Tubing			
120	Float equipment			$ 2,179.00
122	Contract serv. & hauling			$15,850.00
123	Cementing			$ 141,402.00
124	Directional			
148	DST & analysis			
128	Coring & analysis			
129	Logging & perforating		$ 3,815.00	$ 7,630.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			$ 525.00
147	Water		$ 650.00	$ 7,400.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 2,700.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 7,200.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 8,700.00
135	Rentals	Power Swivel	$ 500.00	$ 7,000.00
122	Contract serv.	Swivel Operator		$ 1,700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 13,100.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
208	Wellhead			$ 7,025.00
208-218	Surf. Facilities			
229	Overhead		$ 750.00	$ 17,830.00
865	Miscellaneous			
		TOTAL	$ 15,815.00	$ 377,459.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/26/01

Input DLIS Files

DEFAULT	DSLT_006LUP	FN:7	PRODUCER	25-Aug-2001 14:47	641.0 FT	18.2 FT

Output DLIS Files

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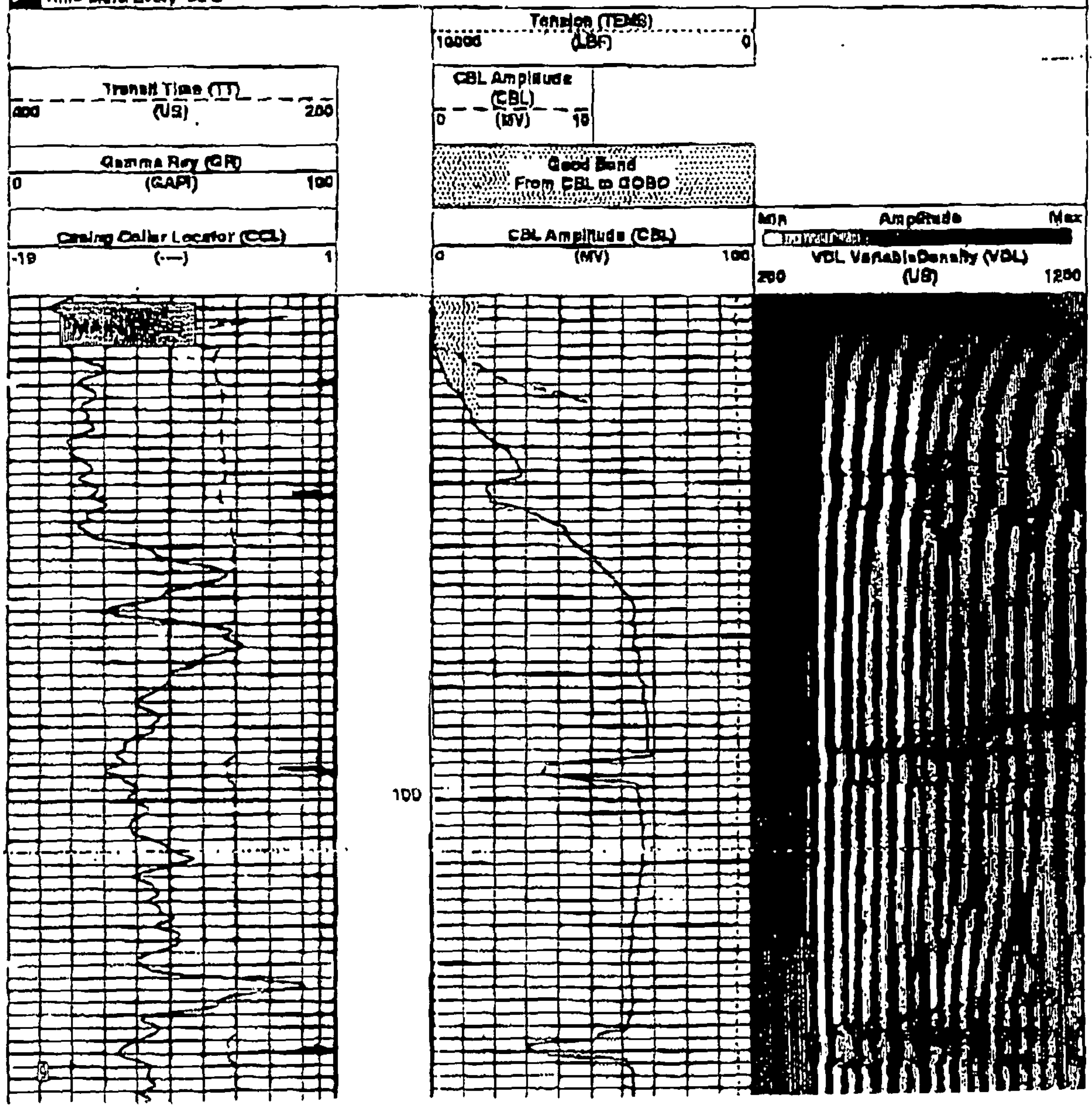
OP System Version: 9C2-303

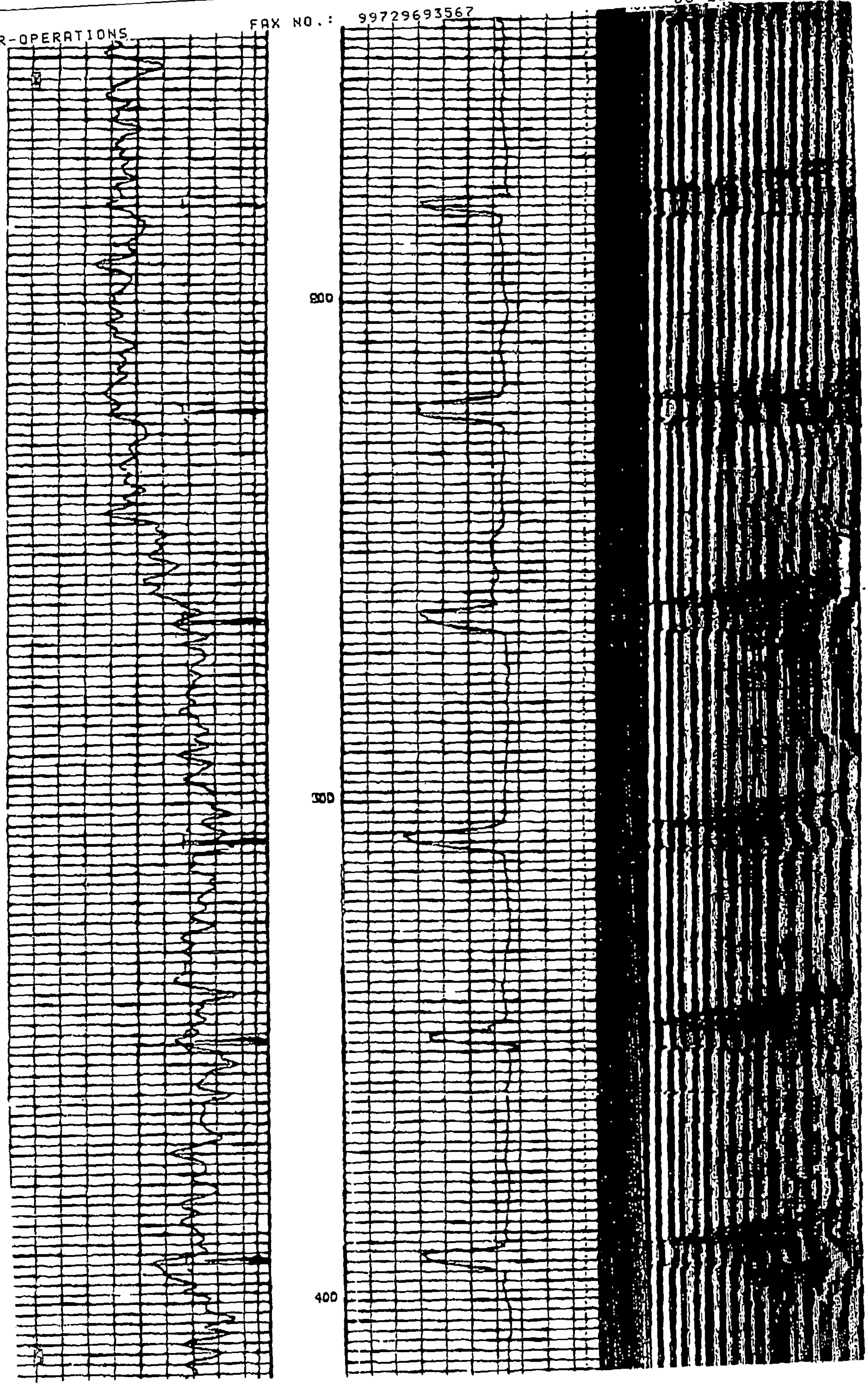
MCM

DSLT-FTB	OP92-KP2	CAL-Y	OP92-KP2
SGT-N	OP92-KP2	DTC-H	9C2-303

PIP SUMMARY

Time Mark Every 60 S

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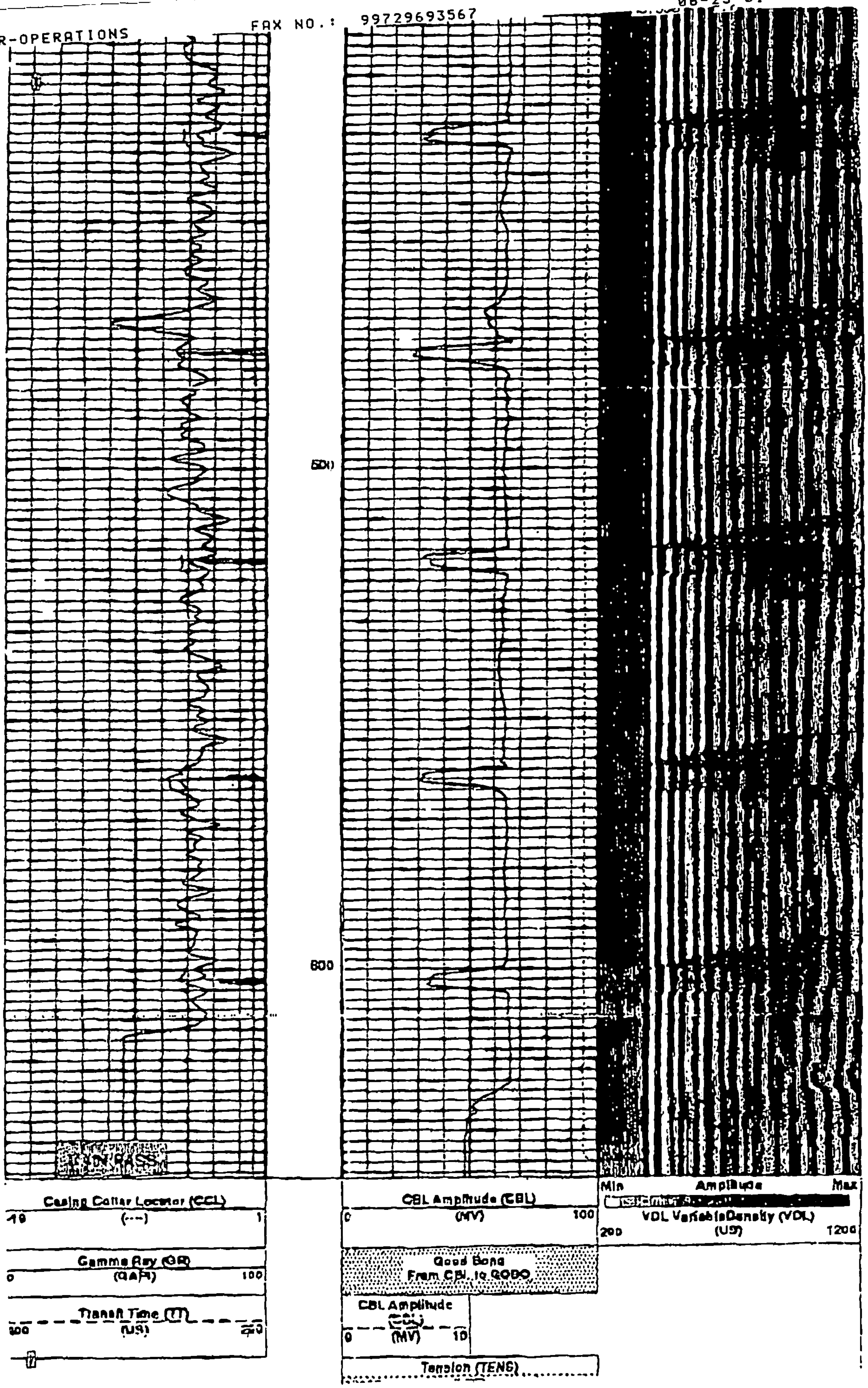
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0 (MV) 100
VDL VariableDensity (VDL)
200 (US) 1200
Gamma Ray (GR)
0 (GAPI) 100
Good Bond
From CBL to GOBO
Transit Time (TT)
400 (US) 200
CBL Amplitude
(CBL)
0 (MV) 10
Tension (TENS)

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
PIONEER BIERE #1-22B	686' GL	Judith River	14

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH DRILLING, INC.	728' KB	728' KB	0

OPERATION @ 0800	CUM MUD COST	DAILY COST	CUM WELL COST
Move Rig to #1-22C	$25,445	$29,110	$408,069

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	pH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
		8.8	30										

PUMP	MAKE @ TYPE	LINER X STROKE	SPM	M3/MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	70						
#2	N/A								

BITS	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT	RPM	CONDITION
3	8 3/4	HTC	GT-1	53560	16	258	697'	439	13.25	##	20	100	
4	4.75	VAR	L2	807081	OPEN	697'	729'	32'	1.5		3		

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	CONN	DOWN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	CALC HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH	COND	BOP TEST
						SURF	DHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00 AM-7:30	Run Baker J-Slot Retrievable Packer w/2.25" "F" nipple. Packer set @ 621' KB.
7:30-8:00	Bullhead 12 bbls. Fresh water w/5.0 gallons of Bariod 100 corrosion inhibitor at 1.5 bpm with 500 psi.
8:00-10:30	Nipple down BOE, install 5 1/2" slips in wellhead, pull 5M tension on packer.
9:30-20:00	Rig down.
	Packer description, "F" nipple and tubing detail in wellfile.

WEATHER	SUPERVISOR	DATE
90 Deg. F	MURRAY BROOKS	8/27/01

Pioneer Natural Resources Canada Inc.

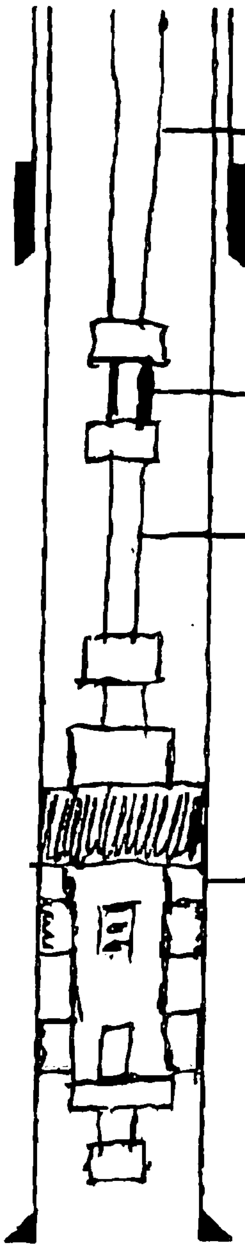
DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor	Dig pit for steel tanks.		$ 3,815.00
105	Mob/Demob	1/3 charged to each well.		$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 94,150.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 3,700.00
114	Mud,Chem,Comp. Fluids			$ 25,445.00
115,117,119,145	Casing			$ 10,125.00
200	Tubing		2250	2250
120	Float equipment			$ 2,179.00
122	Contract serv. & hauling		$700.00	$16,350.00
123	Cementing			$ 141,402.00
124	Directional			
146	13 3/8" Packers		$ 12,410.00	$ 12,410.00
128	5 1/2" Rental Packer & Ser.		$ 3,700.00	$ 3,700.00
129	Logging & perforating			$ 7,630.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			$ 525.00
147	Water		$ 650.00	$ 8,050.00
135	Rentals	Trailer, water,toilets,trash	$ 225.00	$ 2,925.00
135	Rentals	BOP, Hydril, flanges	$ 600.00	$ 7,800.00
135	Rentals	Frac Tanks & Pump	$ 750.00	$ 9,450.00
135	Rentals	Power Swivel		$ 8,500.00
122	Contract serv.	Swivel Operator		$ 1,700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 875.00	$ 13,775.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 7,025.00
208-218	Surf. Facilities			
229	Overhead			$ 17,830.00
885	Miscellaneous			
		TOTAL	$ 29,110.00	$ 408,069.00

WELL NAME	SUPERVISOR	DATE
Pioneer Biere #1-22B	Murray Brooks	8/27/01

THINK IT OUT! WRITE IT OUT!

DATE ____________ WELL NO. ____________ LEASE ____________ FIELD ____________



1	
2	
3	19 JNTS 2 7/8 EUE 8RND TBNG - 601.86'
4	
5	
6	
7	
8	
9	2.25" I.D F NIPPLE - 1.05'
10	
11	
12	6' 2 7/8 EUE 8RND TBNG SUB - 6.10'
13	
14	
15	
16	
17	
18	
19	
20	5322 45 J-LOK CASING PKR 3.90'
TOTAL	SET AT 621.81' M.D. (INCLUDES K.B.)

BAKER OIL TOOLS

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-28-01

Fax #: 303-312-6409 Pages: 3 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C		Surface	0

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	0		

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Drill Rathole.		$19,183	$19,183

MUD DATA	WT
	FW

7:00AM-5:45AM	Level & cleanup Biere 1-22B site, prep Biere 1-22C, Rig up Faith Drilling #2 rig.
5:45AM-6:00AM	Drill rathole.
	8/27/01: Rig up from 7:00AM-13:00 hrs. included 1-Driller, 1-Pusher and a truck drive
	Trucked to location a Rental Kelly & Kelly sock. Load & returned 3.5 Power Swivel.
	Shelly Kim, Environmental Enforcement Officer for Fort Peck Tribes visited location 8/27/01.
	Notified MBOGC of intent to spud by 21:00 hrs., 8/27/01. Also left message on Field Inspector Bob Schmidt Cell & office phones. Will call this AM and adjust spud time.

WEATHER	SUPERVISOR	DATE
	Murray Brooks	8/28/01

FROM: PIONEER-OPERATIONS FAX NO.: 99729693567 303/771-2593 08-27-01 22:09 P.02

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor		$ 800.00	$ 800.00
105	Mob/Demob		$ 7,333.00	$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 7,150.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			
115,117,118,145	Casing			
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$ 800.00	$ 800.00
123	Cementing			
124	Directional			
148	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 225.00
135	Rentals	BOP,Hydril. flanges etc.	$ 600.00	$ 600.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 650.00	$ 650.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 675.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		$ 950.00	$ 950.00
885	Miscellaneous			
		TOTAL	$ 19,183.00	$ 19,183.00

WELL NAME	SUPERVISOR	DATE
HERE 1-22C	MURRAY BROOKS	8/28/01

PIONEER
NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3748
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-29-01

Fax #: 303-312-6409 Pages: 5, including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

NATHAN - THANKS FOR THE QUICK RESPONSE TO OUR PERMIT MODIFICATION REQUEST. WILBUR DOVER

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C	59' KB	Surface	1

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	59' KB	0	59'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Complete nipple up, prep to drill out.		$24,840	$44,023

MUD DATA	PIT	WT	VIS	PV/YP	GELS	PH	WL	CHL	SAND	SOL	OIL	MBT	KTHP @ deg C
	FLOWLINE	FW											

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	60						
#2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	17.5	HTC	1	RR	18	0							

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00AM-7:00AM	Drill rathole
7:00AM-7:30AM	Rig up to drill.
7:30-11:30	Drill 17 1/2" hole from surface to 59' KB.
11:30-14:00	Rig to run casing, run 66.85' of 13 3/8" casing, Rig Schlumberger.
14:00-14:15	Conduct safety meeting.
14:15-15:00	Mix & pump 175 sks. cement. (See Cement report). Rig down Schlumberger.
15:00-18:00	Wait on Cement, rig out 13 3/8" equipment, prep nipple up items.
18:00-6:00 AM	Remove landing joint, nipple up Hydril. Prep to drill out at report time.
	Bob Schmidt (field supervisor w/MBOGC) visited location 8/28/01.
	Note: Today's cement cost includes 150 sks. to be used to cmt. the 9 5/8" casing.

WEATHER	SUPERVISOR	DATE
98 degrees F	Murray Brooks	8/28/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

	2-FRAC TANKS HAVE 1,000 BBLS. FRESH WATER THIS AM.
	5-TANKS HAVE 500 BBLS. MUD.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	8/29/01

Pioneer Natural Resources Canada Inc.

CASING DETAIL

Number	Description	Length	Top @
1	13 3/8" 54.50#, J-55 ST&C, R3 LSS ERW	66.85	0
			0
			0
			0
			0
			0
			0
			0
			0

Total		66.85
Less cut-off	-	21.95
RKB - cut	+	14
Casing landed at		58.9 mKB

Centralizers at : 22'

Bouyed weight of casing : ________ daN

Weight on slips : ________ daN

Cement Detail : Calculated TOC (m) SURFACE Volume circulated (m3) 28.4 BBLS

	tonnes	description	density kg/m3	yield m3/t	slurry volume m3
Stage 1:					
Spacer					
Lead					
Tail					
Stage 2:					
Spacer					
Lead					
Tail					

Plug down time and date : 15:00 PM. 8/28/01

Comments : Circulated 175 SKS. Class G, 2% s-1 and D29, had 10 bbls. Cmt. returns to surface. Displaced w/ 5.71 bbls. Fresh water, close valve. Surface samples hard in 3 hrs. Remove landing joint @ 18:00 hrs. Nipple up.

Note: Casing landed 54" below ground level.

Supervisor : Murray Brooks

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 800.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 14,300.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing		$ 925.00	$ 925.00
200	Tubing			
120	Float equipment		$ 180.00	$ 180.00
122	Contract serv. & hauling		$ 1,050.00	$ 1,850.00
123	Cementing		$ 8,955.00	$ 8,955.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 450.00
135	Rentals	BOP,Hydril, flanges etc.	$ 600.00	$ 1,200.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 650.00	$ 1,300.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 1,350.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead		$ 3,250.00	$ 3,250.00
208-218	Surf. Facilities			
229	Overhead		$ 1,200.00	$ 2,150.00
865	Miscellaneous			
		TOTAL	$ 24,640.00	$ 44,023.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	8/2[illegible]/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-30-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT - WELL 1-22C

COMMENTS:

NATHAN: I SENT YOU AN E-MAIL LISTING THE PERMIT MODIFICATIONS. LET ME KNOW IF THAT IS SUFFICIENT.

WILBUR DOVER

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C	59' KB	Surface	2

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	163' KB	59'	104'

OPERATION @ 0800	CUM MUD COST	DAILY COST	CUM WELL COST
WOC		$16,645	$60,688

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	pH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
		FW	45										

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPA	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	60						
#2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON BIT	RPM	CONDITION
1	17.5	HTC	1	RR	18	0	59	59	3	20		100	
2	12.25	HTC	ATJ1S	EB845	14	59	163	104	8.75	12		100	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	FPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DAILY HRS	CUM ROT HRS

DP & JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
103'	

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTH	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00AM-7:30AM	Nipple up.
7:30AM-9:00AM	Drill mousehole.
9:00-9:30	Test BOE and casing to 500 psi.
9:30-11:00	Drill cement from 30' to 50'.
11:00-15:00	Drill 12 1/4" hole.
15:00-16:45	Build mud viscosity.
16:45-21:30	Drill 12 1/4" hole.
21:30-22:30 AM	Trip out of hole.
22:30-23:45	Wait on Schlumberger and Baker. Prep to squeeze cement from 50' to 154'.
23:45-1:30AM	Set 13 3/8" Baker packer @ 20', rig Schlumberger.
1:30AM-1:45	Conduct safety meeting w/rig crew, Schlumberger & Baker Oil Tools.
1:45-4:30	Mix and pump 655 bbls 50-50 Poz and pump at 6 bpm w/average pump pressure
	of 250 psi. Follow with tail slurry of 65 bbls Class G w/2% calcium chloride.
	Slow rate to 1.5-1.8 bpm for final 24 bbls. of tail slurry. Displace with 6 bbls.
	fresh water. Load cmt. Density @ 12.5#/gal, Tail @ 15.0#/gal.
4:30-6:00AM	Wait on cement.

WEATHER	SUPERVISOR	DATE
98 degrees F	Murray Brooks	8/30/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

Observed the following water flows by shutting down mud pump and waiting 6 minutes.

Depth. KB	Flow rate
73'	no flow
88'	no flow
100'	5-10 bph.
118'	10-15 bph
133'	15-20 bph

2-FRAC TANKS HAVE 500 BBLS. FRESH WATER THIS AM.
5-TANKS HAVE 500 BBLS. MUD.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	8/30/01

FROM: PIONEER-OPERATIONS FAX NO.: 99729693567 08-29-01 22:09 P.04

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 800.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 21,450.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		$ 1,500.00	$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			$ 925.00
200	Tubing			
120	Float equipment			$ 160.00
122	Contract serv. & hauling			$ 1,850.00
123	Cementing		$ 5,045.00	$ 14,000.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 675.00
135	Rentals	BOP,Hydril, flanges etc.	$ 600.00	$ 1,800.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 650.00	$ 1,950.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 2,025.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 3,250.00
208-218	Surf. Facilities			
229	Overhead		$ 800.00	$ 2,950.00
865	Miscellaneous			
		TOTAL	$ 16,645.00	$ 60,668.00

Well Name	Supervisor	Date
BIERE 1-22C	MURRAY BROOKS	8/30/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 8-31-01

Fax #: 303-312-6409 Pages: 4, including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT (BIERE 1-22C)

COMMENTS:

NATHAN - WE WILL PUMP MORE CEMENT TODAY TO ATTEMPT TO STOP WATER FLOW.

WILBUR DOVER

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C	59' KB	Surface	3

CONTRACTOR	DEPTH TODAY/TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	183' KB	59'	104'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
WOC		$18,830	$78,823

MUD DATA	PIT	WT	VIS	PV/YP	GELS	PH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @
	FLOWLINE	FW	45										

PUMP	MAKE & TYPE	LINER & STROKE	SPM			JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
1	EMSCO D-300	5.5 X 14	60						
2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	17.5	HTC	1	RR	18	0	59	59	3	20		100	
2	12.25	HTC	ATJ15	EB845	14	59	163	104	8.75	12		100	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC		EPH	FRAC GRAD	TOP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

	O.D.	CONN	GRADE	WT/METER	LENGTH		
						COND	BOP TEST
						SURF	
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
103'	

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

	ROP	GAS	MUD WT		

6:00AM-16:30	WOC.
16:30-17:30	Pull & lay down 13 3/8" Model "C" Baker full bore packer.
17:30-21:30	Drill hard cement from 40'-70', drill cement from 70'-100', shut down pump @
	75' (3-5 bph flow), @ 100' (25-30 bph flow). Continue to run into hole to 183' KB.
	Well flows at estimated 60-80 bph rate.
21:30-22:00	Pull to casing shoe & shut well in. Wait for Schlumberger.
22:00-6:00AM	Wait for Schlumberger.

WEATHER	SUPERVISOR	DATE
98 degrees F	Murray Brooks	8/31/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

	2-FRAC TANKS HAVE 150 BBLS. FRESH WATER THIS AM.
	5-TANKS HAVE 700 BBLS. MUD.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	8/31/01

FROM: PIONEER-OPERATIONS FAX NO.: 99729693567 303/771-2593 08-30-01 22:15 P.04

P.03

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor		$ 300.00	$ 1,100.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 28,600.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing		$ 3,000.00	$ 3,850.00
200	Tubing			
120	Float equipment			$ 160.00
122	Contract serv. & hauling		$ 500.00	$ 2,350.00
123	Cementing			$ 14,000.00
124	Directional			
146	13 3/8" Packer & Service		$ 3,900.00	$ 3,900.00
128	5 1/2" Rental Packer & Serv.			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water		$ 850.00	$ 850.00
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 900.00
135	Rentals	BOP,Hydril, flanges etc.	$ 660.00	$ 2,480.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 650.00	$ 2,600.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 2,700.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 3,250.00
208-218	Surf. Facilities			
229	Overhead		$ 900.00	$ 2,950.00
865	Miscellaneous			
		TOTAL	$ 18,830.00	$ 78,823.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	8/31/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3748
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-4-01

Fax #: 303-312-~~6409~~ 6191 Pages: 13 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT - BIERE 1-22C

COMMENTS:

REPORTS FOR ~~9-1-~~ 9-1,2,3 & 4-2001.

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C	243' KB	Shale	7

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	697' KB	255'	442'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Short trip to collars, run to 697'.		$15,330	$151,140

MUD DATA	PIT	WT	VIS	PV/YP	GELS	pH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ °C
	FLOWLINE	8.7	35										

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	60						
#2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT DAN	RPM	CONDITION
3	8.75	HTC	GT-1	53550	16	255	697	442	6.5	68	18	100	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP & JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
244'	Bit, Bit sub, X-over, 8-DC's.

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

LEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00AM-16:30	Nipple up 9 5/8". Total nipple up time 26 hrs.
16:30-17:00	Trip in w/8 3/4" bit
17:00-17:15	Pressure test BOE & casing to 500 psi for 15 min. (held OK).
17:15-21:00	Drill cement from 152' to 245'
21:00-1:15AM	Drill 8 3/4" hole from 245' to 467'.
1:15-2:00	Survey @ 467', 1 degree.
2:00-4:00	Drill 8 3/4" hole from 467' to 686'.
4:00-4:15	Survey @ 686', 1 3/4 degree.
4:15-4:30	Drill from 686' to 697'.
4:30-5:30	Circulate
5:30-6:00	Short trip to top of DC's, run in to 697'.

WEATHER	SUPERVISOR	DATE
95 degrees F	Murray Brooks	9/4/01

34,000 - 40,000 ppm Cl_2 - Avg. Sample; WATER FLOW

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

2-FRAC TANKS HAVE 700 BBLS. FRESH WATER THIS AM.
5-TANKS HAVE 1,300 BBLS. MUD.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/4/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,100.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 57,200.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			$ 3,950.00
200	Tubing			
120	Float equipment			$ 1,395.00
122	Contract serv. & hauling		$ 1,350.00	$ 4,600.00
123	Cementing			$ 31,827.00
124	Directional			
146	13 3/8" Packer & Service			$ 7,500.00
128	5 1/2" Rental Packer & Serv.			
129	Logging & perforating		$ 3,850.00	$ 3,850.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,950.00
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 1,800.00
135	Rentals	BOP,Hydril, flanges etc.	$ 680.00	$ 5,200.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 650.00	$ 5,200.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 5,400.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 4,850.00
208-218	Surf. Facilities			
229	Overhead		$ 750.00	$ 6,485.00
665	Miscellaneous			
		TOTAL	$ 15,330.00	$ 151,140.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/4/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,100.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 50,050.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			$ 3,950.00
200	Tubing			
120	Float equipment		$ 1,235.00	$ 1,395.00
122	Contract serv. & hauling			$ 3,250.00
123	Cementing		$ 11,477.00	$ 31,627.00
124	Directional			
146	13 3/8" Packer & Service			$ 7,500.00
128	5 1/2" Rental Packer & Serv.			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,950.00
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 1,575.00
135	Rentals	BOP,Hydril, flanges etc.	$ 680.00	$ 4,520.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 650.00	$ 4,550.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 4,725.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead		$ 1,800.00	$ 4,850.00
208-218	Surf. Facilities			
220	Overhead		$ 1,185.00	$ 5,735.00
865	Miscellaneous			
		TOTAL	$ 24,877.00	$ 135,810.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/3/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C	243' KB	Surface	6

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	255	255'	0

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Nipple up 9 5/8" casing.		$24,877	$135,810

MUD DATA	PIT	WT	VIS	PV/YP	GELS	PH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
	FLOWLINE	9	60										

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPA	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	60						
#2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT	RPM	CONDITION
2	12.25	HTC	ATJ15	EB845	14	59	163	104	8.75	12		100	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	BPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP & JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
103'	

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00AM-7:00	Ream to bottom.
7:00-7:30	Circulate.
7:30-8:30	POOH w/DC's & DP.
8:30-11:00	Pickup 9 5/8" casing equipment, run casing.
11:00-13:00	Circulate.
13:00-13:15	Rig Schlumberger, held Safety Meeting w/rig crew and Service personnel.
13:15-14:30	Cement 9 5/8" casing (see cementing report).
14:30-19:30	WOC.
19:30-2:30 AM	Nipple down
2:30-3:45	Rig Schlumberger Wireline and run CCL, CBL from 156' to surface. Rig down.
3:45-6:00AM	Nipple up 9 5/8".
	Schlumberger log shows good bond to 9 5/8" casing.
	Wellhead between 13 3/8" and 9 5/8" leaking water at 2-3 gallons/hour.

WEATHER	SUPERVISOR	DATE
80 degrees F	Murray Brooks	9/3/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

2-FRAC TANKS HAVE 700 BBLS. FRESH WATER THIS AM.
5-TANKS HAVE 1,300 BBLS. MUD.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/3/01

Time Mark Every 60 S

Tension (TENS)
10000 (LBF) 0

Transit Time (TT)
400 (US) 200

CBL Amplitude (CBL)
0 (MV) 10

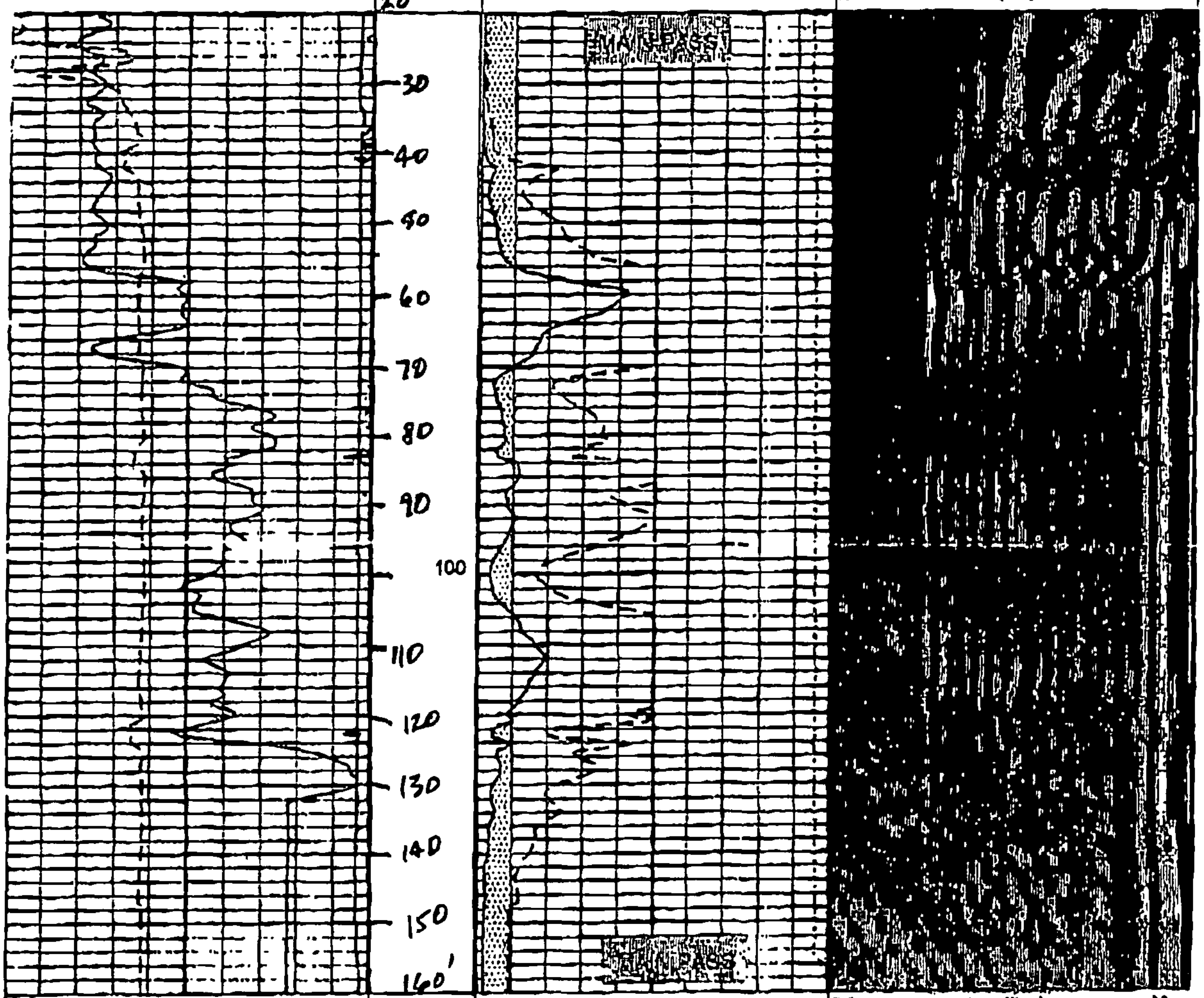
Gamma Ray (GR)
0 (GAPI) 100

Good Bond
From CBL to GOBO

Casing Collar Locator (CCL)
-19 (—) 1

CBL Amplitude (CBL)
0 (MV) 100

Min Amplitude Max
VDL VariableDensity (VDL)
200 (US) 1200



Casing Collar Locator (CCL)
-19 (—) 1

CBL Amplitude (CBL)
0 (MV) 100

Min Amplitude Max
VDL VariableDensity (VDL)
200 (US) 1200

Gamma Ray (GR)
0 (GAPI) 100

Good Bond
From CBL to GOBO

Transit Time (TT)
400 (US) 200

CBL Amplitude (CBL)
0 (MV) 10

Tension (TENS)
10000 (LBF) 0

PIP SUMMARY

Time Mark Every 60 S

Parameters

Pioneer
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DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C	59' KB	Surface	5

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	256	206	49

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Clean out 12 1/4" hole.		$10,830	$110,933

MUD DATA	PIT / FLOWLINE	WT	VIS	PUMP	GELS	PH	WL	CIL	SAND	SOL	OIL	MBT	HTHP @ DEG F
		9	60										

PUMP	MAKE @ TYPE	LINER X STROKE	SPM	M3/MIN	KPA	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	60						
#2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
2	12.25	HTC	ATJ15	EB845	14	59	163	104	8.75	12		100	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH	CSNG		BOP TEST
						COND		BHA INSP
						SURF		SHOE TEST
						INT		MACP
						PROD		

BHA LENGTH	DESCRIPTION
103'	

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00AM-9:30	Drill from 206'-255'
9:30-9:45	Survey @ 233', 1 degree.
9:45-10:15	Trip out of hole.
10:15-10:45	Pickup 9 5/8" casing equipment.
10:45-13:45	Attempt to run 9 5/8" casing, will not go deeper than 55'. Circulate, spud & rotate.
13:45-15:00	Lay down casing. rig up & run Drilling assembly. run in to 255'. no fill or tight spots.
15:00-15:30	Circulate.
15:30-16:30	POOH.
16:30-24:00	Rig & run casing, will not go deeper than 55'. Cut Texas shoe pattern on bottom.
	Tong casing, gain 5'. Circulate & turn w/tongs, no success, Pull & lay down csg.
24:00-2:00AM	Wait on 12 1/4" NBS from Estevan ,SK.
2:00-6:00AM	Wash & ream to 200' @ report time.

WEATHER	SUPERVISOR	DATE
80 degrees F	Murray Brooks	9/2/01

Pioneer
Natural
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Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,100.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 42,900.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			$ 3,950.00
200	Tubing			
120	Float equipment			$ 160.00
122	Contract serv. & hauling		$ 900.00	$ 3,250.00
123	Cementing			$ 20,350.00
124	Directional			
146	13 3/8" Packer & Service			$ 7,500.00
128	5 1/2" Rental Packer & Serv.			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,950.00
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 1,350.00
135	Rentals	BOP,Hydril, flanges etc.	$ 680.00	$ 3,840.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 650.00	$ 3,900.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 4,050.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 3,250.00
208-218	Surf. Facilities			
229	Overhead		$ 550.00	$ 4,550.00
865	Miscellaneous			
		TOTAL	$ 10,830.00	$ 110,933.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/2/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C	59' KB	Surface	4

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	206'	163'	43'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Drill 12 1/4" hole.		$21,480	$100,103

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	FL	CL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
	FLOWLINE	9	36										

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPA	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	60						
#2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	BIT WT	RPM	CONDITION
2	12.25	HTC	ATJ15	EB845	14	59	163	104	8.75	12		100	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	OD	CONN	GRADE	WT / METER	LENGTH	CSG	BOP TEST
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
103'	

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

BREAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00AM-11:00	Wait for Schlumberger.
11:00-11:30	Run 13 3/8" Model "C" Baker full bore packer to 20'. Rig Schlumberger.
11:30-11:45	Conduct safety meeting w/rig crew & service company personnel.
11:45-12:45	Pressure test lines, pump 10 bbls. Fresh water, 40 bbls. Class G w/2% $CaCl_2$.
12:45-18:00	WOC, monitor surface samples.
18:00-18:30	Pull 13 3/8" packer.
18:30-22:00	Drill cement from 54' to 148'. Drill cement @ 1-2'/minute. Cement hard.
	NO SHALE SHAKER OPERATING.
22:00-23:00	Drill from 163' to 179'. NO FLOW FROM WELL WITH PUMP DOWN.
23:00-24:00	Work on Swivel
24:00-2:30AM	TOOH & TIH after cleaning out bit jets.
2:30-4:30	Drilling.
4:30-5:30	Tighten bolts on flow nipple.
5:30-6:00	Drilling.
	Several pieces of rubber on shaker discharge from Hydril. Will replace element.

WEATHER	SUPERVISOR	DATE
98 degrees F	Murray Brooks	9/1/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

2-FRAC TANKS HAVE 1,000 BBLS. FRESH WATER THIS AM.
5-TANKS HAVE 700 BBLS. MUD.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/1/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,100.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 35,750.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			$ 3,950.00
200	Tubing			
120	Float equipment			$ 160.00
122	Contract serv. & hauling			$ 2,350.00
123	Cementing		$ 6,350.00	$ 20,350.00
124	Directional			
146	13 3/8" Packer & Service		$ 3,600.00	$ 7,500.00
128	5 1/2" Rental Packer & Serv.			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water		$ 1,100.00	$ 1,850.00
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 1,125.00
135	Rentals	BOP,Hydril, flanges etc.	$ 680.00	$ 3,160.00
135	Rentals	Frac Tanks, pump,Fork L	$ 650.00	$ 3,250.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 875.00	$ 3,375.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 3,250.00
208-218	Surf. Facilities			
229	Overhead		$ 1,050.00	$ 4,000.00
885	Miscellaneous			
		TOTAL	$ 21,480.00	$ 100,103.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/1/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-4-01

Fax #: 303-312-6409 Pages: 9 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22C	243' KB	Shale	8

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	697' KB	255'	442'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Drill 4 3/4" hole.		$28,835	$179,975

MUD DATA	WT	VIS	PV/YP	GELS	pH	WL	OIL	SAND	SOL	CL	MBT	HTHP @ ___ DEG C
FLOWLINE	8.7	35										

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS & RATE
#1	EMSCO D-300	5.5 X 14	60						
#2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
4	4.75	VAR	L-2	807073	Open	697							

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	CPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

KEY DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00AM-8:00	Lay down DP & Collars.
8:00-10:00	Nipple down.
10:00-12:00	Run Guide shoe, shoe joint, float collar and 18 jts. 5 1/2" csg. Land @ 679'.
12:00-12:30	Reciprocate pipe & circ. Rig Schlumberger.
12:30-12:45	Safety meeting
12:45-14:00	Pressure test, pump 15 bbl. Water spacer. 51 bbls, cement, bump plug w/750 psi.
14:00-18:00	WOC
18:00-1:30AM	Nipple up BOE.
1:30-2:30	Rig Schlumberger Wireline. run CBL W/CCL from 631' to surface, good bond, RD.
2:30-6:00 AM	Pickup 4 3/4" bit, X-over, 8-3 1/2" DC's and 2 7/8" tubing to 630'.

WEATHER	SUPERVISOR	DATE
95 degrees F	Murray Brooks	9/5/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

2-FRAC TANKS HAVE 500 BBLS. FRESH WATER THIS AM.
5-TANKS HAVE 1,300 BBLS. MUD.

Dredged solids from reserve pit, allow to dry.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/5/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,100.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 64,950.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,118,145	Casing		$ 5,000.00	$ 8,950.00
200	Tubing			
120	Float equipment		$ 1,050.00	$ 2,445.00
122	Contract serv. & hauling		$ 700.00	$ 5,300.00
123	Cementing		$ 7,480.00	$ 39,307.00
124	Directional			
148	13 3/8" Packer & Service			$ 7,500.00
128	5 1/2" Rental Packer & Serv.			
129	Logging & perforating		$ 3,850.00	$ 7,700.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,950.00
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 2,025.00
135	Rentals	BOP,Hydril, flanges etc.	$ 680.00	$ 5,880.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 650.00	$ 5,050.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 6,075.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 4,850.00
208-218	Surf. Facilities			
229	Overhead		$ 1,375.00	$ 7,860.00
665	Miscellaneous			
		TOTAL	$ 28,835.00	$ 179,875.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/5/01

Pioneer
Natural
Resources
Canada
Inc.

PIPE TALLY

Well Name:	BIERE 1-22C	Tally by:	Rig Crew	Date:	9/4/01
Pipe Size:	5 1/2"	Weight:	15.50#	Grade:	J-55
Thread:	LT& C	Total joints:		Joints ran:	

1	43.67	11	44.2	21		31		41		51		61	
2	43.4	12	44.78	22		32		42		52		62	
3	44.6	13	44.28	23		33		43		53		63	
4	43.2	14	41.55	24		34		44		54		64	
5	38.82	15	44.5	25		35		45		55		65	
6	43.4	16	24.85	26		36		46		56		66	
7	43.25	17	15	27		37		47		57		67	
8	43.9	18		28		38		48		58		68	
9	44.1	19		29		39		49		59		69	
10	42.7	20		30		40		50		60		70	
	428.84		259.26		0		0		0		0		0

71		81		91		101		111		121		131	
72		82		92		102		112		122		132	
73		83		93		103		113		123		133	
74		84		94		104		114		124		134	
75		85		95		105		115		125		135	
76		86		96		106		116		126		136	
77		87		97		107		117		127		137	
78		88		98		108		118		128		138	
79		89		99		109		119		129		139	
80		90		100		110		120		130		140	
	0		0		0		0		0		0		0

Total	688.1
Total not run	0
Total run	688.1

Joints not run	
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
	0

Pioneer Natural Resources Canada Inc.

CASING DETAIL

Number	Description	Length	Top @
3	5 1/2" 15.50#, J-55 LT&C, R3 LSS ERW	688.1	
			0
			0
			0
			0
			0
			0
			0
			0

Total		688.1
- Less cut-off	-	15
RKB - cut	+	6
Casing landed at		679.1 mKB

Centralizers at : 674', 644', 556', 476', 389', 303', 214'. 128' & 84'.

Bouyed weight of casing : ______ daN

Weight on slips : ______ daN

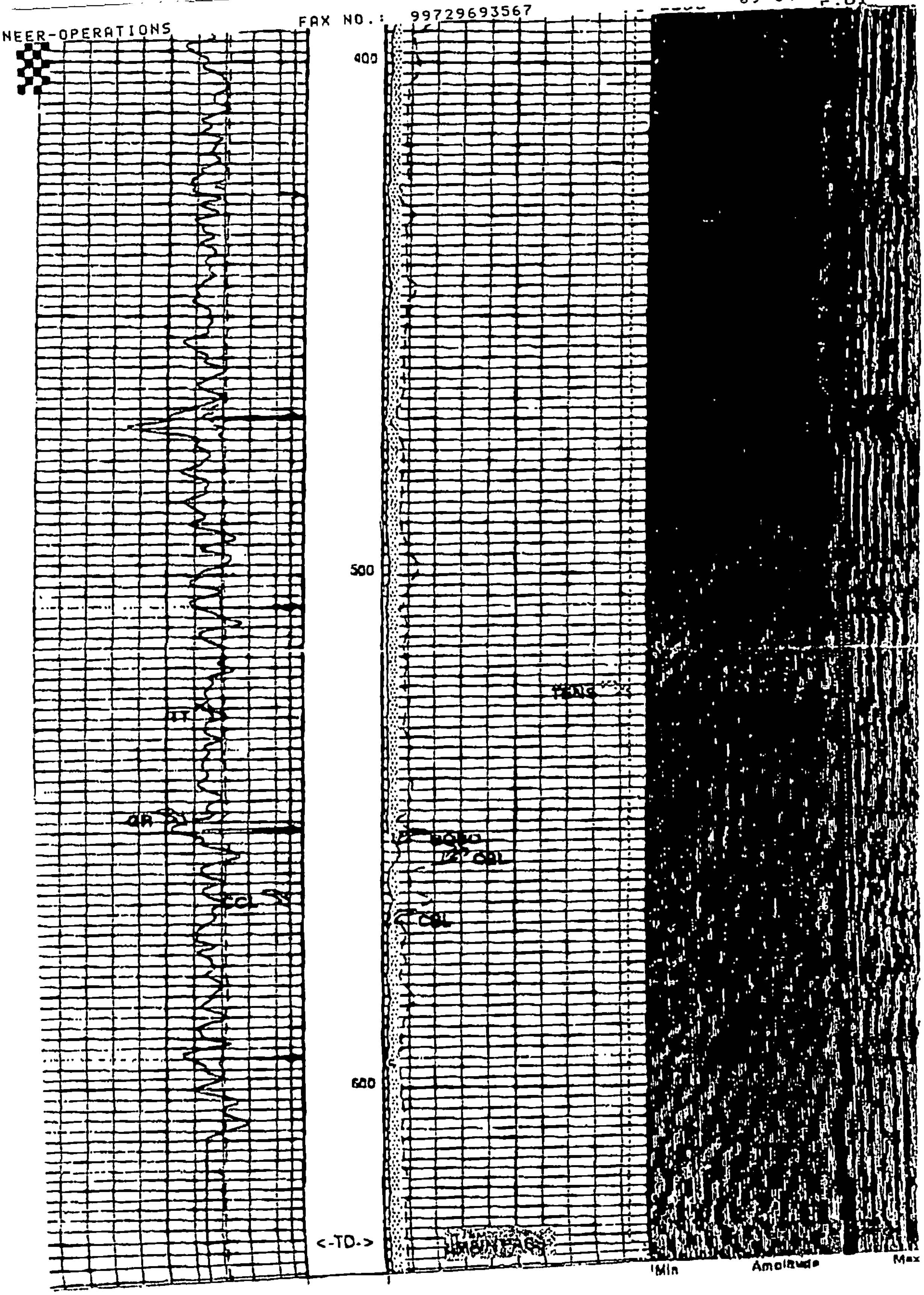
Cement Detail : Calculated TOC (m) SURFACE Volume circulated (m3) 51 bbls.

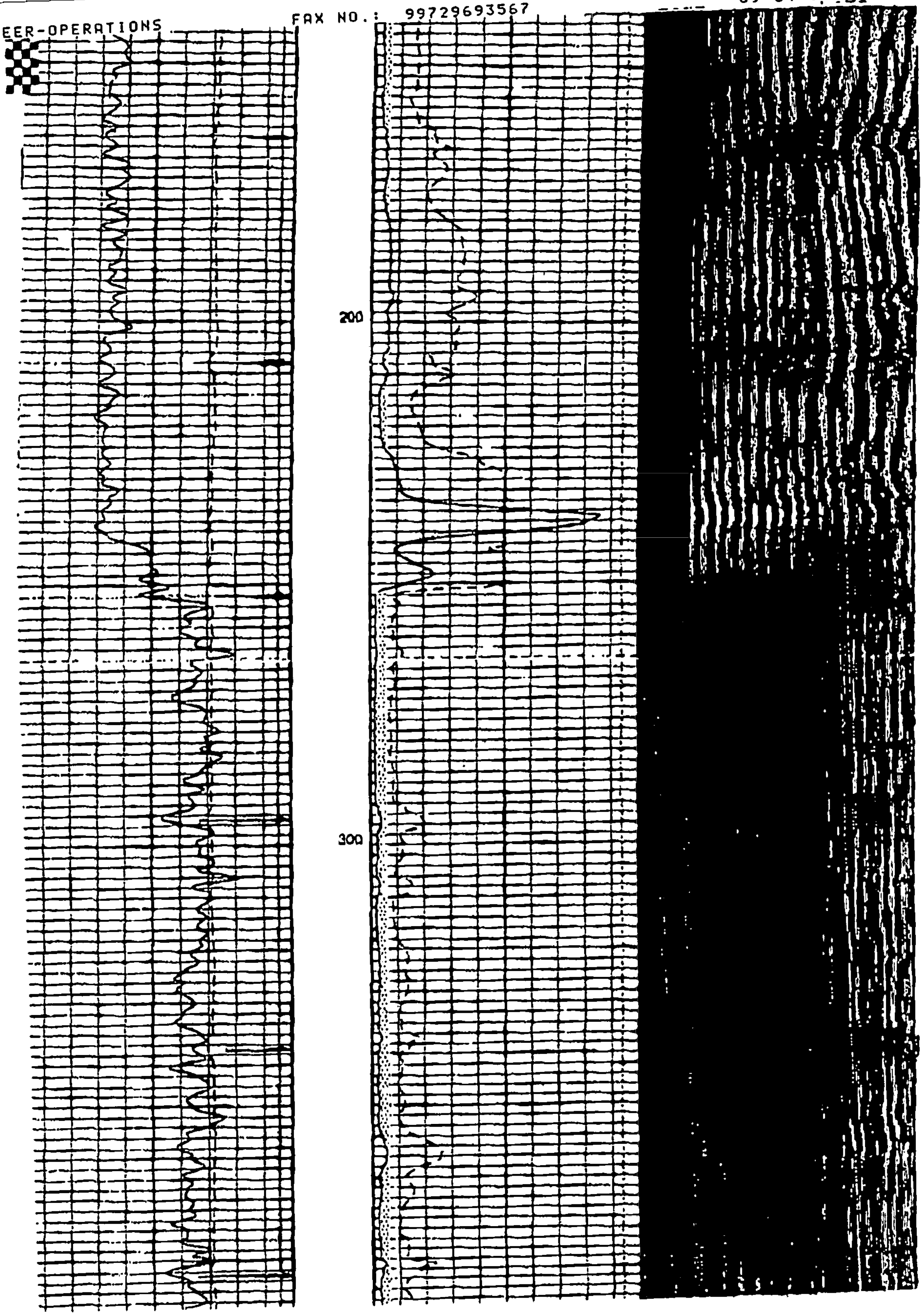
Stage 1:	tonnes	description	density kg/m3	yield m3/t	slurry volume m3
Spacer					
Lead					
Tail					
Stage 2: Spacer					
Lead					
Tail					

Plug down time and date : 14:00 hrs., 9/4/01

Comments : Circulated 250 cu. ft.(51 bbls.) Class G, 2% S-1 and D29, had 12 bbls. Cmt. returns to surface. Displaced w/ 15.30 bbls. fresh water, plug held, close valve. Surface samples hard in 4 hrs. Remove landing joint @ 18:00 hrs. Pumped cmt. @ 3.5 bpm. slow to 2.0 bpm during displacement.

Supervisor : Murray Brooks


400
500
600
<-TD->
Min
Amplitude
Max


200
300

PRODUCER 05-Sep-2001 03:27 608.5 FT 31.5 FT

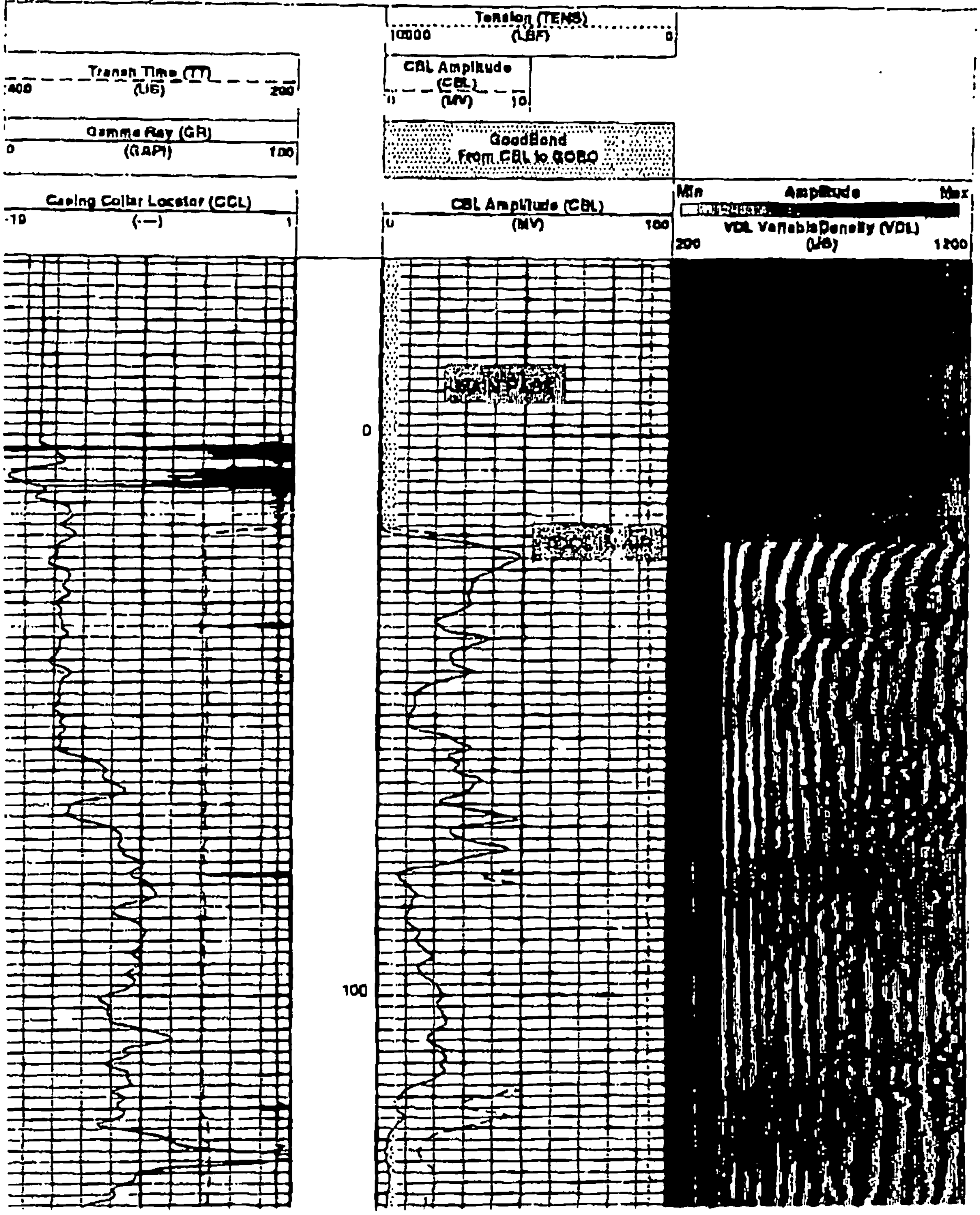
OP System Version: 8C2-303

MCM

DSLT-FTB	OP82-KP2	CAL-Y	OP82-KP2
SGT-N	OP82-KP2	DTC-H	8C2-303

PIP SUMMARY

Time Mark Every 60 S



PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-6-01

Fax #: 303-312-6409 Pages: 4, including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Bioro 1-22C	687'	Shale	9

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Drilling #2	~~[illegible]~~ 844'	697'	147'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Rig Down		$19,180	$198,405

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	PH	WL	CAKE	SAND	SOL	OIL	MBT	HTHP @ ___ deg C
	FLOWLINE	8.7	35										

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	KPA	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D-300	5.5 X 14	80						
#2	NA								

BIT #	SIZE	MAKE	TYPE	SER NO	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON BIT	RPM	CONDITION
4	4.75	VAR	L-2	807073	Open	697	844'	147'	9	18	5	75	

MUD LOG DATA	DEPTH	MUD WT	DOG	CO	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP IN SHALE

TORQUE	ROT WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	CALC HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH	CSNG	BOP TEST
						SURF	MAX MSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

BREAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

6:00AM-8:00	Pickup 4 3/4" bit. X-over, 8-3 1/2" DC's and 2 7/8" tubing to 630'.
8:00-9:00	Rig Power Swivel
9:00-10:00	Pressure test casing & BOE to 1,000 psi. held OK.
10:00-13:00	Drill cement from 635' to 680'.
13:00-17:45	Drill 4 3/4" hole from 680' to 838', check for flow every 10'.
17:45-18:00	Drilling break from 838' to 844'. water flow begins at + or - 10 bph. WATER
	TEMPERATURE MEASURED AT 119 DEGREES F. NO OIL
18:00-18:30	Tear out Power Swivel. Take water samples for Halliburton & Energy Labs.
18:30-19:45	Stand back 600' of 2 7/8" tubing. lay down tubing & DC's.
19:45-20:30	Wait on Baker w/packer.
20:30-21:30	Pickup Baker model "J" packer.
21:30-23:00	Pump 15 bbls. Fresh water w/5 gallons Baiod Inhibitor down annulus.
23:00-23:15	Set Packer @ 814' KB.. remove BOP.
	Joe Doney broke collar bone when chain & boomer failed & one side of BOP fell.
23:15-6:00AM	Rig down.

WEATHER	SUPERVISOR	DATE
85 degrees F	Murray Brooks	9/6/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

2-FRAC TANKS HAVE 500 BBLS. FRESH WATER THIS AM.
5-TANKS HAVE 1,300 BBLS. MUD.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/5/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor		$ 800.00	$ 1,800.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 71,500.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		$ 750.00	$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			$ 8,950.00
200	Tubing		$ 2,250.00	$ 2,250.00
120	Float equipment			$ 2,445.00
122	Contract serv. & hauling		$ 700.00	$ 8,000.00
123	Cementing			$ 39,307.00
124	Directional			
146	13 3/8" Packer & Service			$ 7,500.00
128	5 1/2" Rental Packer & Serv.		$ 3,800.00	$ 3,800.00
129	Logging & perforating			$ 7,700.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,950.00
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 2,250.00
135	Rentals	BOP,Hydril, flanges etc.	$ 680.00	$ 6,560.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 850.00	$ 8,500.00
135	Rentals	Power Swivel	$ 500.00	$ 500.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 6,750.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 4,850.00
208-218	Surf. Facilities			
229	Overhead		$ 1,000.00	$ 8,880.00
865	Miscellaneous			
		TOTAL	$ 19,180.00	$ 198,405.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/8/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-7-01

Fax #: 303-312-6409 Pages: 3 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

2-FRAC TANKS HAVE 500 BBLS. FRESH WATER THIS AM.
5-TANKS HAVE 1,300 BBLS. MUD.

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/6/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor		$ 800.00	$ 1,800.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 71,500.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		$ 750.00	$ 1,500.00
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			$ 8,950.00
200	Tubing		$ 2,250.00	$ 2,250.00
120	Float equipment			$ 2,445.00
122	Contract serv. & hauling		$ 700.00	$ 6,000.00
123	Cementing			$ 39,307.00
124	Directional			
146	13 3/8" Packer & Service			$ 7,500.00
128	5 1/2" Rental Packer & Serv.		$ 3,800.00	$ 3,800.00
129	Logging & perforating			$ 7,700.00
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,950.00
135	Rentals	Trailer,water,toilets,trash	$ 225.00	$ 2,250.00
135	Rentals	BOP,Hydril, flanges etc.	$ 880.00	$ 6,580.00
135	Rentals	Frac Tanks, pump,Fork L.	$ 850.00	$ 8,500.00
135	Rentals	Power Swivel	$ 500.00	$ 500.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 6,750.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			$ 4,850.00
208-218	Surf. Facilities			
228	Overhead		$ 1,000.00	$ 8,860.00
865	Miscellaneous			
		TOTAL	$ 18,180.00	$ 198,405.00

WELL NAME	SUPERVISOR	DATE
BIERE 1-22C	MURRAY BROOKS	9/6/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-10-01

Fax #: 303-312-6409 Pages: 11 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

REPORTS FOR 9-8, 9, & 10-01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biero 1-22D			1

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Rig #2	62' KB	0	62'

OPERATION @ 6:00	CUM MUD COST	DAILY COST	CUM WELL COST
~~WOC~~ RUN 13 3/8" CASING	$1,790	$26,203	$36,633

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT on	RPM	CONDITION
1	17.5	HTC	RR										

6:00-20:30	Rig up.
20:30-22:00	Drill rathole.
22:00-1:30AM	Spud in 17 1/2" hole @ 22:00 hrs. 9/7/01. Notified MBOGC & Bob Schmidt (MBOGC
	Drilled 17 1/2" hole to 62' KB.
1:30AM-6:00AM	Pickup 67' of 13 3/8" 54.50# casing. Attempt to screw Landing joint to the
	single joint to be run through report time.

WEATHER	SUPERVISOR	DATE
52 degrees F	Murray Brooks	9/8/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

	2-Frac tanks have inventory of 0 bbls. fresh water.
	5- Frac tanks have inventory of 1,300 bbls. Mud.

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/8/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor		$ 1,200.00	$ 1,200.00
105	Mob/Demob		$ 7,333.00	$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 14,300.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids		$ 1,790.00	$ 1,790.00
115,117,119,145	Casing		$ 1,000.00	$ 1,000.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling	Replace Hydril element	$ 4,000.00	$ 4,000.00
123	Cementing			
124	Directional			
148	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal			
147	Water			
135	Rentals	Trailer,water,toilets,trash	$ 325.00	$ 650.00
135	Rentals	BOP, Hydril, Flanges etc.	$ 680.00	$ 1,360.00
135	Rentals	Frac Tanks, pump, Fork lift	$ 650.00	$ 1,300.00
135	Rentals	Power Swivel	$ 100.00	$ 200.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 1,350.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		$ 1,300.00	$ 2,150.00
865	Miscellaneous			
		TOTAL	$ 26,203.00	$ 36,633.00

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/8/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22D	50'	Surface	2

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Rig #2	130' KB	82'	68'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
WOC	$1,790	$55,240	$91,873

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	17.5	HTC	RR		open	0	62	82'					
2	12.25	REED	RR	JC2482	14	62	130	68'	5				

6:00-7:00	Screw Landing joint into top joint, land collar of joint 54" below ground level.
7:00-8:00	Rig Schlumberger, hold Safety meeting, pump 37 bbls. (200 sks. Class G w/2%
	Calcium chloride), displace w/8 bbls. fresh water. Had 11 bbls. Cement returns
8:00-12:00	WOC
12:00-20:00	Nipple up.
20:00-22:30	Drill mousehole, pressure casing & Hydril to 800 psi.
22:30-24:45	Drill hard cement from 37' to 50', flow @ 2 bpm at 72'.
24:45-1:45 AM	Lose circulation at 82'. Gain circulation.
1:45-2:30	Well flowing hot water & shale from 110'-130'. Water flowing at 2 bpm. Have a
	pickup load of shale around Hydril.
2:30-3:30	Stand back DC's, lay down bit.
3:30-4:15	Pickup 1-joint 4 1/2" DP, run in, chain down, close Hydril, rig Schlumberger,
	conduct Safety meeting.
4:15-6:00AM	Pump 2000 sks. Class G, followed w/ 150 sks. class G w/2% calcium chloride.
	Pumped at 4.3 bpm at an average of 220 psi. 440 bbls. slurry pumped.
	Slow rate to 2 bpm for last 25 bbls., displace w/8 bbls. fresh water, close in.

WEATHER	SUPERVISOR	DATE
38 degrees F	Murray Brooks	9/9/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

2-Frac tanks have inventory of 900 bbls. fresh water.
5- Frac tanks have inventory of 300 bbls, Mud.

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/9/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,200.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 21,450.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			$ 1,780.00
115,117,119,145	Casing			$ 1,000.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling	Replace Hydril element		$ 4,000.00
123	Cementing		$ 41,280.00	$ 41,280.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis	Baker Packer	$ 650.00	$ 650.00
132	Stimulation			
133	Waste handling & Disposal			
147	Water		$ 1,100.00	$ 1,100.00
135	Rentals	Trailer,water,toilets,trash	$ 325.00	$ 975.00
135	Rentals	BOP, Hydril, Flanges etc.	$ 680.00	$ 2,040.00
135	Rentals	Frac Tanks, pump, Fork lift	$ 650.00	$ 1,950.00
135	Rentals	Power Swivel	$ 100.00	$ 300.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 2,025.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		$ 2,630.00	$ 4,780.00
665	Miscellaneous			
		TOTAL	$ 55,240.00	$ 91,873.00

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/9/01

Pioneer
Natural
Resources
Canada
Inc.

CASING DETAIL

Number	Description	Length	Top @
1	13 3/8", 54.50#/ft, J-55, ST&C	67.12	0
			0
			0
			0
			0
			0
			0
			0
			0

Total		67.12
Loss cut-off	-	22
RKB - cut	+	4.8
Casing landed at		49.72 mKB

Centralizers at : 22'

Bouyed weight of casing : ______ daN

Weight on slips : ______ daN

Cement Detail : Calculated TOC (m) ______ Volume circulated (m3) ______

Stage 1:	tonnes	description	density kg/m3	yield m3/t	slurry volume m3
Spacer					
Lead					
Tail					
Stage 2: Spacer					
Lead					
Tail					

Plug down time and date : 9/8/01 7:15

Comments : Pump 17 bbls. fresh water, follow with 200 sks. Class G w/2% calcium chloride (38 bbls. slurry)
Displace with 6 bbls. fresh water. Had 11 bbls. cement returns to surface.
Pumped at 2 bpm w/100 psi.

Supervisor : Murray Brooks

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22D	50'	Surface	3

CONTRACTOR	DEPTH TODAY/TVD	DEPTH YESTERDAY	PROGRESS
Faith Rig #2	133' KB	130'	3'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
WOC	$1,790	$25,080	$118,983

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	17.5	HTC	RR		open	0	82	82'					
2	12.25	REED	RR	JC2482	14	130	183	3	0				

6:00-7:30	Rig down Schlumberger after 2150 sk. Cement squeeze.
7:30-16:30	Wait on cement.
16:30-17:30	Drill hard cement from 46' to 70', drops out of cement and starts water flow (2 bpm)
	and heaving shale.
17:30-19:30	TOOH, unplug bit jets, TIH.
19:30-2:00 AM	Rotate, circulate, add polymer while working into hole from 70' to 133'. Well
	continues to heave shale and flow water. Have 6 or 7 cubic yards of shale. Circulate
	from the flowline directly to reserve pit. Make connection to drill deeper, cannot get
	Kelly into bushings because of fill. POOH
2:00AM-2:30	Pickup 1 joint 4 1/2" DP, run in, chain down, close Hydril, rig Schlumberger,
	conduct Safety meeting.
2:30-3:15	Pump 550 sks. Class G, followed w/ 150 sks. class G w/2% calcium chloride.
	Pumped at 4.1 bpm at an average of 200 psi. 135 bbls. slurry pumped.
	Slow rate to 2 bpm for last 10 bbls., displace w/6 bbls. fresh water, close in.
3:15-6:00AM	Wait on cement.

WEATHER	SUPERVISOR	DATE
50 degrees F	Murray Brooks	9/10/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

2-Frac tanks have inventory of 900 bbls. fresh water.
5- Frac tanks have inventory of 300 bbls. Mud.

Please Note: Joe Doney, listed on morning tour, is not on location.

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/10/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,200.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 28,600.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			$ 1,790.00
115,117,119,145	Casing			$ 1,000.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling	Replace Hydril element		$ 4,000.00
123	Cementing		$ 14,310.00	$ 55,590.00
124	Directional			
148	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis	Baker Packer		$ 650.00
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,100.00
135	Rentals	Trailor,water,toilets,trash	$ 325.00	$ 1,300.00
135	Rentals	BOP, Hydril, Flanges etc.	$ 680.00	$ 2,720.00
135	Rentals	Frac Tanks, pump, Fork lift	$ 650.00	$ 2,600.00
135	Rentals	Power Swivel	$ 100.00	$ 400.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 2,700.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		$ 1,200.00	$ 5,980.00
865	Miscellaneous			
		TOTAL	$ 25,090.00	$ 116,963.00

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/10/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: Nathan Wiser (EPA) Denver Date: 9-11-01

Fax #: 303-312-6409 Pages: 4, including this cover sheet.

From: Wilbur Dover

Subject: Biere Daily Report

COMMENTS:

FROM: PIONEER-OPERATIONS FAX NO.: 99729693567 09-10-01 22:40 P.02

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22D	50'	Surface	4

CONTRACTOR	DEPTH TODAY/TVD	DEPTH YESTERDAY	PROGRESS
Faith Rig #2	167' KB	133'	34'

OPERATION @ 6:00	CUM MUD COST	DAILY COST	CUM WELL COST
WOC	$1,790	$25,780	$142,743

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON BIT	RPM	CONDITION
1	17.5	HTC	RR		open	0	62	62'					
2	12.25	REED	RR	JC2482	14	133	167	34'	4				

6:00-13:00	Wait on cement.
13:00-15:30	Drill hard cement from 46' to 70', drops out of cement and starts water flow (2 bpm)
15:30-19:00	Rotate, circulate, mix vis pills while working into hole from 70' to 133'. Well flowing
	and heaving shale.
19:00-20:30	Drill formation from 134' to 167'.
20:30-21:45	POOH, run 1 jt. 4 1/2" DP, chain down, rig Schlumberger, conduct safety meeting.
21:45-22:45	Pump 550 sks. Class G, followed w/ 150 sks. class G w/2% calcium chloride.
	Pumped at 4.1 bpm at an average of 200 psi. 135 bbls. slurry pumped.
	Slow rate to 2 bpm for last 10 bbls., displace w/8 bbls. fresh water, close in.
22:45-23:00	Squeeze pumping finished at 22:45 PM, rig down Schlumberger.
23:00-6:00AM	Wait on cement. Will drill out at 9:00 AM, 9/11/01

WEATHER	SUPERVISOR	DATE
50 degrees F	Murray Brooks	9/11/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

2-Frac tanks have inventory of 300 bbls. fresh water.
5- Frac tanks have inventory of 300 bbls. Mud.

Please Note: Released 4-Frac tanks 9/7/01
Cleaned up location, build berm around rig. Begin cleaning Frac tanks w/vacuum trucks.
Had verbal estimate to dispose of solids on location and trucked to Bishon Disposal
for about $20,000.00. Disposal Operator will check w/State to be sure he is in
compliance for taking 40,000 PPM chlorides in material into his site.

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/11/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor		$ 700.00	$ 1,900.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 35,750.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			$ 1,790.00
115,117,119,145	Casing			$ 1,000.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling	Replace Hydril element		$ 4,000.00
123	Cementing		$ 14,250.00	$ 69,840.00
124	Directional			
148	DST & analysis			
126	Coring & analysis			
128	Logging & perforating			
130	Testing & Analysis	Baker Packer		$ 650.00
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,100.00
135	Rentals	Trailer,water,toilets,trash	$ 325.00	$ 1,625.00
135	Rentals	BOP, Hydril, Flanges etc.	$ 680.00	$ 3,400.00
135	Rentals	Frac Tanks, pump, Fork lift	$ 650.00	$ 3,250.00
135	Rentals	Power Swivel	$ 100.00	$ 500.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 3,375.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		$ 1,250.00	$ 7,230.00
865	Miscellaneous			
		TOTAL	$ 25,780.00	$ 142,743.00

WELL NAME	SUPERVISOR	DATE
Blere 1-22D	Murray Brooks	9/11/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-12-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22D	50'	Surface	5

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Rig #2	167' KB	133'	34'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Drill out after Squeeze #4	$1,790	$29,725	$172,488

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	17.5	HTC	RR		open	0	62	62'					
2	12.25	REED	RR	JC2482	14	133	167	34'	4				

6:00-9:00AM	Wait on cement.
9:00-13:30	Drill hard cement from 45' to 70', drops out of cement and starts water flow (2 bpm)
13:30-19:00	Rotate, circulate, mix vis pills while working into hole from 70' to 130'. Well flowing
	and heaving shale. Unable to work deeper.
19:00-20:30	POOH, run Baker 13 3/8" full bore packer & set at 30'. Rig Schlumberger.
20:30-20:45	Conduct safety meeting.
20:45-21:00	Pump 700 sks. Class G w/2% calcium chloride.
	Pumped at 5.7 bpm at an average of 275 psi. 143 bbls. slurry pumped.
	Slow rate to 2 bpm for last 4 bbls., displace w/3.5 bbls. fresh water, close in.
21:00-21:00	Squeeze pumping finished at 20:45 PM, rig down Schlumberger.
21:00-2:00AM	Wait on cement. Will drill out at 2:00 AM, 9/12/01
2:00-3:30	Release Baker packer, Run in hole.
3:30-6:00 AM	Drill hard cement from 48' to 76'. Water flow begins @ 1-1 1/2 bpm at 72'.

WEATHER	SUPERVISOR	DATE
50 degrees F	Murray Brooks	9/12/01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

2-Frac tanks have inventory of 1,300 bbls. fresh water.
2- Frac tanks have inventory of 300 bbls. Mud.

Mr. Jim Boyter w/Helena EPA visited location.

Begin trucking solids to Dishon Disposal 9/12/01.

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/12/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,800.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 42,900.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud.Chem.Comp. Fluids			$ 1,780.00
115,117,119,145	Casing			$ 1,000.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling	Replace Hydril element		$ 4,000.00
123	Cementing		$ 15,150.00	$ 84,990.00
124	Directional			
148	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis	Baker Packer	$ 3,580.00	$ 4,230.00
132	Stimulation			
133	Waste handling & Disposal			
147	Water			$ 1,100.00
135	Rentals	Trailer,water,toilets,trash	$ 325.00	$ 1,950.00
135	Rentals	BOP, Hydril, Flanges etc.	$ 880.00	$ 4,080.00
135	Rentals	Frac Tanks, pump, Fork lift	$ 650.00	$ 3,900.00
135	Rentals	Power Swivel	$ 100.00	$ 600.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 4,050.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		$ 1,415.00	$ 8,645.00
885	Miscellaneous			
		TOTAL	$ 29,725.00	$ 172,488.00

WELL NAME	SUPERVISOR	DATE
Biere 1-22D	Murray Brooks	9/12/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: Nathan Wiser (EPA) Denver Date: 9-13-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: Wilbur Dover

Subject: Biere Daily Report

COMMENTS:

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
Biere 1-22D	50'	Surface	8

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
Faith Rig #2	167' KB	133'	34'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
Wait for final load of cement to arrive.	$12,576	$23,168	$195,634

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	17.5	HTC	RR		open	0	62	62'					
2	12.25	REED	RR	JC2482	14	133	167	34'	4				

6:00-8:00AM	Circulate & wash to 167'. Well flowing 2 bpm and producing shale.
8:00-17:00	Circulate, rotate clean hole by circulating vis sweeps while waiting for cement.
17:00-17:30	POOH.
17:30-18:00	Run 13 3/8" Baker packer and set @ 30'.
18:00-20:30	Wait on Dowell, rig Dowell, conduct Safety Meeting. Flood
20:30-21:00	Pump 500 sks. class G w/3% calcium chloride, 35% Silica ~~flower~~ & 1/4# cello flk.
	Pumped @ 5.5 bpm at 300 psi, displace w/20 bbls. Fresh water.
21:00-1:00AM	WOC, sample very hard after 4 hrs. Water flowing back prior to cementing.
1:00-1:45	Pump 500 sks. class G w/3% calcium chloride, 35% Silica ~~flower~~ & 1/4# cello flk.
	Pumped @ 5.5 bpm at 300 psi, displace w/15 bbls. Fresh water. Flour
	Have water flowing back. Cement samples very hard @ 4 hrs.
1:45-6:00AM	Wait on cement. At report time, wait on last load of cement to be delivered.

WEATHER	SUPERVISOR	DATE
38 degrees F	Murray Brooks	9/13/01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

page 2

2-Frac tanks have inventory of 1,300 bbls. fresh water.
2- Frac tanks have inventory of 300 bbls. Mud.

Mr. Jim Boyter w/Helena EPA visited location 9/12/01 for 1/2 hr.

Clean 2 Frac tanks.

Truck to Williston 2-20', 13 3/8" cut-offs, 1-35', 13 3/8" cut-off & 1-42.40' jt. 9 5/8" csg.
Also sent 2-13 3/8" by 9 5/8" wellheads to Williston to be returned to Marta-Co.

WELL NAME	SUPERVISOR	DATE
Bjere 1-22D	Murray Brooks	9/13/01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			$ 1,800.00
105	Mob/Demob			$ 7,333.00
144	Fuel & lubricants			
107	Drilling Daywork		$ 7,150.00	$ 50,050.00
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids		$ 10,788.00	$ 12,576.00
115,117,119,145	Casing			$ 1,000.00
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		$ 1,200.00	$ 5,200.00
123	Cementing			$ 84,990.00
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis	Baker Packer		$ 4,230.00
132	Stimulation			
133	Waste handling & Disposal			
147	Water		$ 650.00	$ 1,750.00
135	Rentals	Trailer,water,toilets,trash	$ 325.00	$ 2,275.00
135	Rentals	BOP, Hydril, Flanges etc.	$ 680.00	$ 4,760.00
135	Rentals	Frac Tanks, pump, Fork lift	$ 500.00	$ 4,400.00
135	Rentals	Power Swivel	$ 100.00	$ 700.00
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		$ 675.00	$ 4,725.00
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		$ 1,100.00	$ 9,745.00
885	Miscellaneous			
		TOTAL	$ 23,168.00	$ 195,634.00

WELL NAME	SUPERVISOR	DATE
Blero 1-22D	Murray Brooks	9/13/01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3748
Fax: 972/969-3567

To: Nathan Wiser (EPA) Denver Date: 9-17-01

Fax #: 303-312-6409 Pages: 12, including this cover sheet.

From: Wilbur Dover

Subject: Biere Daily Report

COMMENTS:

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
BIERE 1-22D	13 3/8" @ 50'	SURF	8

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH Rig #2	256'	167'	

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
RU CEMENTERS	12576	55,941	315,865

MUD DATA	PIT	WT	VIS	PV/YP	GELS	pH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
	FLOWLINE	WATER											

PUMP	MAKE @ TYPE	LINER X STROKE	SPM	US GAL/MIN	kPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D500	5 1/2 X 14	60	236	400				
#2									

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT DON	RPM	CONDITION
2	12 1/4	RTC	RR	JC24RR	3/4	62					All	80/150	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

LP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

BREAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

0600 - 0845	WOC, SIDPP 23 psi / DOWELL
0845 - 0915	SQUEEZE w/ 500 sx CLASS G + 3% CaCl2 + 1/4 #/sx CELLOFLAKE, MIXING WT 15.8 #/gal, YIELD 1.15 ft³/sx, SQUEEZE @ 4.2 BPM @ 200-250 psi, DISPL w/ 4.3 Bbls FR WTR
0915 - 1345	SI, WOC
1345 - 1430	Rel Pkr & TOH, TIH w/ BIT
1430 - 1915	TAGD CMT @ 45' & BEGAN DRLG AS FOLLOWS: 23' SL. FLOW, 75' NO FLOW, 85' CMT BECOMING RATTY - NO FLOW, 100' BEGAN FLOW +/- 1 BPM, DRILLED RATTY CMT TO 166'
1915 - 2130	DRLD TO 255'
2130 - 2200	CIRC HOLE CLEAN
2200 - 2400	TOH, REMOVE DRLG NIPPLE

WEATHER	SUPERVISOR	DATE
60°F OVERCAST	BROOKS / COOPER	9-15-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

2400 - 0545	RU & RAN CASING (SEE ATTACHED), WASH 20' TO BOTTOM, LAND CASING @ 244.33'
0545 - 0600	RU CEMENTERS

WELL NAME	SUPERVISOR	DATE
BIERS 1-22D	BROOKS / COOPER	9-15-01

Pioneer
Natural
Resources
Canada
Inc.

CASING DETAIL

Number Jts.	Description	Length	Top @
1	9 5/8", 36#, J55, STC	45.90	198.43
1	WEATHERFORD INSERT FLOAT	0.00	198.43
5	9 5/8", 36#, J55, STC	209.88	11.00

Total	255.78
Less cut-off	22.45
RKB - cut	11.00
Casing landed at	244.33 mKB

Centralizers at : 198, 105,

Bouyed weight of casing : 2500 # daN

Weight on slips : All daN

Cement Detail : Calculated TOC (m) ______ Volume circulated (m3) ______

	tonnes	description	density kg/m3	yield m3/t	slurry volume m3
Stage 1:					
Spacer					
Lead					
Tail					
Stage 2:					
Spacer					
Lead					
Tail					

Plug down time and date : ______

Comments : ______

Supervisor : Cooper

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			1900
105	Mob/Demob			7333
144	Fuel & lubricants			
107	Drilling Daywork		7150	64350
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem.Comp. Fluids			12,576
115,117,119,145	Casing			1000
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling			5200
123	Cementing		31,100	156,140
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			8330
132	Stimulation			
133	Waste handling & Disposal	HAUL TO DISHON	10,000	17,000
147	Water			2400
135	Rentals			
	TRAILER at 21		325	2925
	BOP's		680	6120
	TANK, FORK LIFT		600	5400
	SWIVEL		100	900
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		1000	6400
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		2543	15,348
865	Miscellaneous		2543	2543
		TOTAL	55,941	315,865

WELL NAME	SUPERVISOR	DATE
BIERE 1-22D	BROOKS / COOPER	9-15-01

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
BIERE 1-22D	9 5/8" @ C 44'	BEAR PAW	9

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH RIG #2	370'	255'	115'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
DRLG	12,576	48,522	364,387

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	pH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
		WATER											

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	kPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D300	5 1/2 X 14							
#2									

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT daN	RPM	CONDITION
3	8 3/4	HTC	GT-1	53550	3-16	255		115	2 1/4	51	10	80-120	

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	DPP	FRAC GRAD	KOP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
277'	BIT SUB, 8 DC

SURVEYS DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

0600 - 0730	RU DOWELL, CEMENT 9 5/8" CASING w/ 150 sx CLASS G + 2% $CaCl_2$ MIXED @ 6 BPM, MIXING WT 15.8 #/gal, YIELD 1.15 ft3/sx, DISP w/ 16.2 BBLS FR WTR @ 6-1.5 BPM, PLUG DID NOT BUMP, FLOAT HELD OK, PLUG DN 0720 hrs 9-16-01, CIRC 3 BBLS CONTAMINATED CMT TO SURF, RD DOWELL
0730 - 1115	WOC, LEFT 2" FROM DRILLING SPOOL FLOWING @ 1/2 - 3/4 BPM SALT WATER (WATER HOT BUT NOT TOO HOT TO TOUCH)
1115 - 1130	RU DOWELL ON BRADENHEAD SQUEEZE 200 sx CLASS G + 2% $CaCl_2$, SQUEEZE @ 3.3 BPM @ 200-150 psi, DISP TO 3/4 BBL BELOW HEAD SWI, CMT MIXING WT 15.8 #/gal, YIELD 1.15 ft3/sx, CALC TOC 11.6 BGL

WEATHER	SUPERVISOR	DATE
40°F, OVERCAST	COOPER	9-16-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

page 2

1130 - 1530	WOC
1530 - 2000	SICP - TSTM, OPEN WELL, NO FLOW, SET SLIPS, BACK OUT LJ, NU 9 5/8" CSG HD & 13 5/8" 3M ANNULAR
2000 - 2100	RU SCHLUMBERGER, RAN GR-CBL 130' - SURF, GOOD BOND THROUGHOUT RD SCHLUM.
2100 - 0015	INSTALL DRILLING NIPPLE, TIH
0015 - 0300	DRILL CEMENT 130' - 255'
0300 - 0330	DRILL TO 277'
0330 - 0415	SURVEY, 1 1/4° @ 247'
0415 - 0600	DRILL

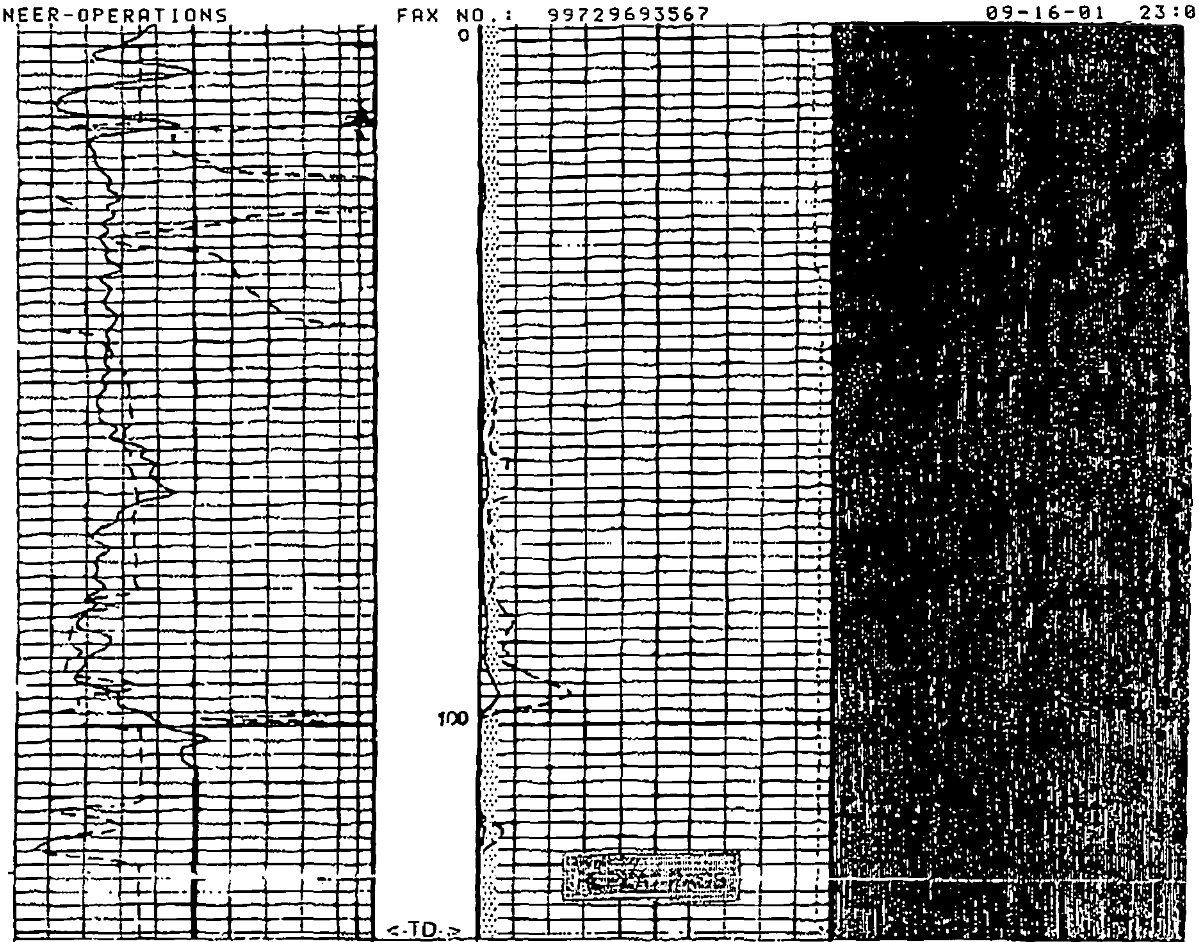
WELL NAME	SUPERVISOR	DATE
BIERE 1-220	COOPER	9-16-01

Pioneer Natural Resources Canada Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			1900
105	Mob/Demob			2333
144	Fuel & lubricants			
107	Drilling Daywork		7150	71,500
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			12576
115,117,119,145	Casing		3825	4,825
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling	WELDING	200	5900
123	Cementing		13,604	164,744
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			8390
132	Stimulation			
133	Waste handling & Disposal		10,000	22,000
147	Water			2400
135	Rentals			
	TRAILER, ETAL		325	3250
	BOP'S		680	6800
	TANK, FORKLIFT		500	5900
	SWIVEL		100	1000
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		1000	7400
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead		6726	6726
208-218	Surf. Facilities			
229	Overhead		2206	17,554
865	Miscellaneous		2206	4729
		TOTAL	48,582	364,387

WELL NAME	SUPERVISOR	DATE
BIERE 1-22-D	COOPER	9-16-01



Casing Collar Locator (CCL)		
-19	(---)	1
Gamma Ray (GR)		
0	(GAPI)	100
Transit Time (TT)		
400	(US)	200

CBL Amplitude (CBL)		
0	(MV)	100
Good Bond From CBL to GOBO		
CBL Amplitude (CBL)		
0	(MV)	10
Tension (TENS)		
10000	(LBF)	0

VDL VariableDensity (VDL)		
200	(US)	1200

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
	Telemetry Mode	DSLC_FTB	
	DSLT Firing Mode	CBL_W	
AMSG	Auxiliary Minimum Sliding Gate	187	US
CBAF	CBL Adjustment Factor	0.9	
CBCF	CBL Correction Factor	1.2	
CBLG	CBL Gate Width	65	US
CCLD	CCL reset delay	12	IN
CCLT	CCL Detection Level	0.3	V
DDEL	Digitizing Delay	0	US
DFAD_TYPE	DFAD type	DFAD	
DRCS	DSLT DLIS Recording Size	120	
DSIN	Digitizing Sample Interval	10	
DTFS	DSLC Telemetry Frame Size	206	
DWCO	Digitizing Word Count	120	
GAI	Manual Gain	40	
GOBO	Good Bond	5	MV
MAHTR	Manual High Threshold Reference	40	

BIERE 1-22 D

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
BIERE 1-22D	5½ @ 696.85	BEAR PAW	10

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH RIG #2	700'	370'	330'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
PU 2⅞" TUBING	12,576	30,297	597,684

MUD DATA: WATER

PUMP	MAKE @ TYPE	LINER x STROKE	SPM	M3/MIN	kPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D300	5½x14							
#2									

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
3	8¾	HTC	GT-1	53550	3-16	255	700	445	7¾	57.4	10	BOTH	2-2-I

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS
						5½	

BHA LENGTH	DESCRIPTION
234.64	4¾" BIT, 8-3½" DC's, XO

0600-0730 (1½) DRLG TO 460'
0730-0800 (½) CLEAN PITS
0800-1200 (4) DRLG TO 700' TD FOR 8¾" HOLE
1200-1230 (½) SHORT TRIP TO CSG SHOE, 5' FILL
1230-1300 (½) CIRC, DROP SURVEY
1300-1500 (2) LDDP & DC
1500-1530 (½) REMOVE DRLG NIPPLE
1530-1800 (1½) RU TO RUN CSG, RAN 5½" CSG AS FOLLOWS:

	LENGTH	TOP @
WEATHERFORD GUIDE SHOE	.80	696.05
1 JT 5½, 15.50, J55 LTC CSG	40.20	655.85
WEATHERFORD INSERT FLOAT	-0-	655.85
15 JTS 5½" 15.50#, J55, LTC, CSG	647.68	
TOTAL	688.68	
LANDED BELOW KB (7 LAND JT)	8.17	
CASING LANDED @	696.85	

WEATHER	SUPERVISOR	DATE
40°F CLEAR	COOPER	9-10-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

	CENTRALIZERS @ 691, 656, 569, 483, 398, 309, 225, 140, 51
1700-1830 (1½)	RU DOWELL, CIRC W/ RIG PUMP, CMT W/ 5 Bbls WTR AHEAD, 250 SX CLASS G + 2% CaCl2 + 1/4 #/SX CELLOFLAKE, MIXED @ 6 BPM, MIXING WT 15.8 #/gal, YIELD 1.15 ft³/sx, DISP W/ 15.8 Bbls FR WTR, DID NOT BUMP PLUG, FLOAT HELD OK., CIRC. 10 Bbls CMT TO PIT, PLUG DN 1825 hrs 9-16-01
1830-2230 (4)	W.O.C.
2230-0230 (4)	PU HYDRIL, SET SLIPS W/ FULL STRING WT, INSTALL 5½" 2M INDEPENDANT CASING HEAD, W/ 2-2" LPO W/ 2-2" 2M BALL VALVES, NU 7 1/16" 3M 2 RAM BOP
0230-0600 (3½)	PU & TIH W/ 4 3/4" BIT + 8-3½" DC's ON 2 7/8" TUBING, 440' @ REPORT TIME

WELL NAME	SUPERVISOR	DATE
BIERL 1-22D	Cooper	9-17-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			1200
105	Mob/Demob			2333
144	Fuel & lubricants			
107	Drilling Daywork		7150	78,650
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			12,526
115,117,119,145	Casing	5 1/2 CASING	5200	10,025
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling			5400
123	Cementing		8773	178,517
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating		3815	3815
130	Testing & Analysis			8330
132	Stimulation			
133	Waste handling & Disposal			22,000
147	Water			2400
135	Rentals			
	TRAILER et al		325	3575
	BOP'S		680	7480
	TANK, FORKLIFT		500	6400
	SWIVEL		100	1100
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		1000	8400
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		1377	18,931
865	Miscellaneous		1377	6106
		TOTAL	30297	394,687

WELL NAME	SUPERVISOR	DATE
BIERZ 1-22D	COOPER	9-17-01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-18-01

Fax #: 303-312-6409 Pages: 4 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
BIERS 1-22D	5½ @ 696.85	JUDITH RIVER	11

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH RIG #2	729	700	29

OPERATION @ 0800	CUM MUD COST	DAILY COST	CUM WELL COST
RIG RELEASED	12,576	25,991	420,675

MUD DATA	FIT	WT	VIS	PV/YP	GELS	pH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
FLOWLINE		WATER											

PUMP	MAKE @ TYPE	LINER x STROKE	SPM	M3/MIN	kPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D300	5½x14	60	236	600				
#2									

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
4	4¾	VAR	LHZ	79642	OPEN	700	729	29	2½	11.6	2-4	60	1-1-I

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D	CONN	GRADE	WT / METER	LENGTH	CSG	
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
234.64	4¾" BIT, 8-3½" DC's, XO

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

0600-0800	(2)	PU 2⅞" Tbg, TAG @ 550', TOH
0800-1030	(2½)	PU SWIVEL
1030-1130	(1)	RU SCHLUM, RAN GR-CBL 518'-SURF GOOD BOND THROUGHOUT, RD SCHLUM.
1130-1300	(1½)	TIH PRS TEST CASING 1000 # / 15 MIN, HELD OK.
1300-1700	(4)	DRLG SOFT TO HARD CMT, PLUG, FLOAT AND SHOE
1700-1930	(2½)	DRLG 4¾" HOLE TO 729' (720' BGL)
1930-2115	(1¾)	CIRC. HOLE CLEAN, LD SWIVEL, TOH, LDDC'S
2115-2330	(2¼)	PU BAKER J-LOCK PACKER & TIH ON 2⅞" TUBING
2330-2345	(¼)	PUMP 10.25 Bbls INHIBITED FR. WTR DOWN 5½" x 2⅞" ANNULUS @ 2.89 BPM @ 450 psi

WEATHER	SUPERVISOR	DATE
40°F, P.C.	COOPER	9-18-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

2345-2400	(¼) SET PACKER WITH 5000# TENSION & LAND TUBING AS FOLLOWS:
	LENGTH TOP @
	BAKER J-LOCK PACKER 4.45' 643.47
	2⅜" 6.5# L80 EUE 8rd PUP 6.19' 637.28
	2.25" F PROFILE NIPPLE 1.02' 636.26
	20 JTS 2⅜", 6.5#, J55, EUE 8rd TBG 630.26'
	TOTAL 641.90
	LANDED BELOW KB 6.00
	EOT @ 647.90
2400-0130	(1½) ND BOP'S, SET SLIPS, INSTALL PACKING IN TUBING HEAD, PRS TEST ANNULUS 800 #/15 MIN, INSTALL 2½" 3M MASTER VALVE
0130-0400	(2½) CLEAN PITS, RIG RELEASED @ 0400hrs 9-18-01

WELL NAME	SUPERVISOR	DATE
BIERE 1-22D	COOPER	9-18-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			1900
105	Mob/Demob			7333
144	Fuel & lubricants			
107	Drilling Daywork		2150	85,800
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		750	750
114	Mud,Chem,Comp. Fluids			12,576
115,117,119,145	Casing			10,025
200	Tubing		2600	2600
120	Float equipment			
122	Contract serv. & hauling			5400
123	Cementing			128,517
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating		3815	7630
130	Testing & Analysis			8330
132	Stimulation			
133	Waste handling & Disposal		2000	29,000
147	Water			2400
135	Rentals			
	TRAILER etal		325	3900
	BOP's		680	8160
	TANK, FORKLIFT		500	6900
	SWIVEL		1100	2200
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		1000	9400
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.		3709	3709
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		1181	20,112
865	Miscellaneous		1181	7267
		TOTAL	25,991	420,675

WELL NAME	SUPERVISOR	DATE
BIERE 1-22D	COOPER	9-18-01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'CONNOR BLVD., STE. 1400
IRVING, TX 75039-3746
FAX: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-19-01

Fax #: 303-312-6409 Pages: 3, including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

9-18-01- RIGGED UP ON BIERE 1-22 A (RELIEF WELL).

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
BIERE 1-22A	5½ C 700'		1

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH #2	-0-	-0-	-0-

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
RU POWER SWIVEL		33,262	33,262

MUD DATA	PIT	WT	VIS	PV/YP	GELS	PH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ ___ deg C
	FLOWLINE												

PUMP	MAKE & TYPE	LINER X STROKE	SPM	M3/MIN	kPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D300	5½ x 14							
#2									

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT	RPM	CONDITION

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH	COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

BREAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

0600 - 2300	(17)	MIRURT
2300 - 2345	(3/4)	WELD ON CSG STUB
2345 - 0315	(3½)	INSTALL 6½" 2M INDEPENDANT TBG HD & 2-2" LPO & 2-2" 2M BALL VALVES, NU 7 1/16" 3M DRILLING FLANGE & 7 1/16" 3M DOUBLE RAM BOP, TEST BOP'S 500 psi
0315 - 0600	(2¾)	PU & STRAP DC'S ON CATWALK, RU POWER SWIVEL
		VISITED BY BOB SCHMIDT OF MBOGC - OK

WEATHER	SUPERVISOR	DATE
45°F, CLEAR	COOPER	9-19-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor		2000	2000
105	Mob/Demob		7333	7333
144	Fuel & lubricants			
107	Drilling Daywork		7150	7150
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		250	250
114	Mud.Chem,Comp. Fluids			
115,117,119,145	Casing			
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		1500	1500
123	Cementing			
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal		8000	8000
147	Water			
135	Rentals			
	TRAILER etal		325	325
	BOP's		680	680
	TANK, FORKLIFT		500	500
	SWIVEL		1000	1000
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		1000	1000
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		1512	1512
865	Miscellaneous		1512	1512
		TOTAL	33,262	33,262

WELL NAME	SUPERVISOR	DATE
BIERE 1-22A	COOPER	9-19-01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: Nathan Wiser (EPA) Denver **Date:** 9-20-01

Fax #: 303-312-6409 **Pages:** 3 , including this cover sheet.

From: Wilbur Dover

Subject: Biere Daily Report

COMMENTS:

Pioneer Natural Resources Canada Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
BIERE 1-22A	5 1/2" C700'	CASED	2

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH RIG #2	620'	-0-	620'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
RU SWIVEL	-0-	33,831	67,093

MUD DATA	PIT / FLOWLINE	WT	VIS	PV/YP	GELS	pH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ ___ deg C
		WATER											

PUMP	MAKE @ TYPE	LINER X STROKE	SPM	M3/MIN	KPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D300	5 1/2 X 14	40	157	600				
#2									

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT ON	RPM	CONDITION
1	4 1/2	VAR	C2	780239	OPEN	-0-	620	620	18 1/4	34.0	2	60	6-6-I
2	4 1/2	VAR	C2	790238	OPEN								

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM ROT HRS

DP & JTS	O.D.	CONN	GRADE	WT / METER	LENGTH	CSG	BOP TEST
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
234.65	BIT, BIT SUB, 8 - 3 1/2" DC'S, XO

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

BREAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

0600 - 0630	(1/2)	RU SWIVEL
0630 - 1400	(7 1/2)	DRILL HARD CEMENT 14'-75', DRILL UNIDENTIFIED OBSTRUCTION @ 75', BEGAN LOSING RETURNS WHILE DRILLING, WELL FLOWS DURING CONNECTIONS 1-2 BPM - 165°F, CONTINUE DRLG SOFT CMT TO 240', BAD THREADS ON TBG - DC X-OVER, ~~etc~~.
1400 - 1530	(1 1/2)	W.O. ON NEW X-OVER
1530 - 2100	(5 1/2)	DRILL TO 439', NO CHANGES
2100 - 2200	(1)	WO WATER
2200 - 0315	(5 1/4)	DRILL TO 620', NO CHANGES
0315 - 0600	(2 3/4)	TRIP FOR BIT, TAG @ 70', ATTEMPT TO WORK THRU W/ NO SUCCESS, R.U. SWIVEL

WEATHER	SUPERVISOR	DATE
50°F, CLEAR	Cooper	9-20-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			2000
105	Mob/Demob			7333
144	Fuel & lubricants			
107	Drilling Daywork		7150	14,300
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		750	1500
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		250	1250
123	Cementing			
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal		13,000	21,000
147	Water		4000	4000
135	Rentals			
	TRAILER at 2L		325	650
	BOP's		680	1360
	TANK FORKLIFT		500	1000
	SWIVEL		2400	3400
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		1000	2000
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead		700	700
208-218	Surf. Facilities			
229	Overhead		1538	3050
865	Miscellaneous		1538	3050
		TOTAL	33,831	67,093

WELL NAME	SUPERVISOR	DATE
BIERE 1-22A	COOPER	9-20-01

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-21-01

Fax #: 303-312-6409 Pages: 3 , including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

Pioneer
Natural
Resources
Canada
Inc.

DAILY DRILLING REPORT

WELL	LAST CASING	FORMATION	DAYS FROM SPUD
BIERE 1-22A	5 1/2" @ 700'	CASED	2

CONTRACTOR	DEPTH TODAY / TVD	DEPTH YESTERDAY	PROGRESS
FAITH RIG #2	620'	-0-	620'

OPERATION @ 0600	CUM MUD COST	DAILY COST	CUM WELL COST
RU SWIVEL	-0-	33,831	67,093

MUD DATA	PIT	FLOWLINE	WT	VIS	PV/YP	GELS	pH	WL	CHL	SAND	SOL	OIL	MBT	HTHP @ deg C
			WATER											—

PUMP	MAKE @ TYPE	LINER X STROKE	SPM	M3/MIN	kPa	JET VEL	AV-DP	AV-DC	SLOW PUMP PRS @ RATE
#1	EMSCO D300	5 1/2 X 14	40	157	600				
#2									

BIT #	SIZE	MAKE	TYPE	SER NO.	JETS	DEPTH IN	DEPTH OUT	METERAGE	HOURS	ROP	WT	RPM	CONDITION
1	4 1/2	VAR	C2	780239	OPEN	-0-	620	620	18 1/4	37.0	2	60	6-6-I
2	4 1/2	VAR	C2	730238	OPEN								

MUD LOG DATA	DEPTH	MUD WT	BGG	CG	TG	DXC	SH DEN	EPP	FRAC GRAD	ROP in SHALE

TORQUE	ROT. WT	PU WT	SO WT	BHA WT - AIR	BHA WT - MUD	DRLG HRS	CUM BOT HRS

DP # JTS	O.D.	CONN	GRADE	WT / METER	LENGTH		
						COND	BOP TEST
						SURF	BHA INSP
						INT	SHOE TEST
						PROD	MACP

BHA LENGTH	DESCRIPTION
234.65	BIT, BIT SUB, 8 - 3 1/2" DC'S, XO

SURVEYS	DEPTH	INC	AZ	DEPTH	INC	AZ	DEPTH	INC	AZ

PEAK DEPTHS	ROP	GAS	MUD WT	CHLORIDES	GAS ANALYSIS

0600-0630	(1/2)	RU SWIVEL
0630-1400	(7 1/2)	DRILL HARD CEMENT 14'-75', DRILL UNIDENTIFIED OBSTRUCTION @ 75', BEGAN LOSING RETURNS WHILE DRILLING, WELL FLOWS DURING CONNECTIONS 1-2 BPM - 165°F, CONTINUE DRLG SOFT CMT TO 240', BAD THREADS ON TBG - DC X-OVER, ~~etc~~.
1400-1530	(1 1/2)	W.O. ON NEW X-OVER
1530-2100	(5 1/2)	DRILL TO 439', NO CHANGES
2100-2200	(1)	WO WATER
2200-0315	(5 1/4)	DRILL TO 620', NO CHANGES
0315-0600	(2 3/4)	TRIP FOR BIT, TAG @ 70', ATTEMPT TO WORK THRU W/ NO SUCCESS, R.U. SWIVEL

WEATHER	SUPERVISOR	DATE
50°F, CLEAR	COOPER	9-20-01

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DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			2000
105	Mob/Demob			7333
144	Fuel & lubricants			
107	Drilling Daywork		7150	14,300
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits		750	1500
114	Mud,Chem,Comp. Fluids			
116,117,119,145	Casing			
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		250	1250
123	Cementing			
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating			
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal		13,000	21,000
147	Water		4000	4000
135	Rentals			
	TRAILER et AL		325	650
	BOP's		680	1360
	TANK, FORKLIFT		500	1000
	SWIVEL		2400	3400
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		1000	2000
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead		700	700
208-218	Surf. Facilities			
229	Overhead		1538	3050
805	Miscellaneous		1538	3050
		TOTAL	33,831	67,093

WELL NAME	SUPERVISOR	DATE
BIERE 1-22A	COOPER	9-20-01

*
TL data
Pressure data

PIONEER

NATURAL RESOURCES

FAX TRANSMISSION

5205 N. O'Connor Blvd., Ste. 1400
Irving, TX 75039-3746
Fax: 972/969-3567

To: NATHAN WISER (EPA) DENVER Date: 9-24-01

Fax #: 303-312-6409 Pages: 4, including this cover sheet.

From: WILBUR DOVER

Subject: BIERE DAILY REPORT

COMMENTS:

Pioneer
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Resources
Canada
Inc.

DAILY COMPLETION REPORT

WELL: BIERS 1-22 A, B, C, D				REPORT #: Page 1 of 2		
OPERATION: WO. SILICATE SQUEEZE						
SITP:	SICP:	DWC: 52,663	CWC: 1,146,905		OIL	WATER
PERFORATED INTERVAL		ZONE	BEGINNING LOAD			
			FLUID USED			
			FLUID RECOVERED			
			LOAD TO RECOVER			
PBTD:	ELEV: RKB:		G.L.:	RKB-THF:		

1-22A SQUEEZE WELL VIA 5½" CASING W/ 700 SX CLASS G + 3% $CaCl_2$, MIXING WT 15.8 #/gal, YIELD 1.15 ft³/sx, TOTAL SLURRY 143.4 BBLS, AS FOLLOWS:

ESTABLISH INJECTION - 3 BPM @ 60#, 4BPM @ 96#
START CEMENT @ 4BPM @ 200-220 psi

30 BBls AWAY	4.5	220
70 BBLS AWAY - SLOW RATE	1.5	70
80 BBLS AWAY	2.1	100
110 BBLS AWAY	1.8	95
120 BBLS AWAY	1.7	100
END OF SLURRY	1.7	100

DISPLACE W/ ¼ BBL FR WTR @ ¼ BPM @ 60#
EST. TOC @ 11' BGL
SWI, SECURE WELL, CMT IN PLACE @ 1230 hrs 9-21-01

1-22B PULLED FWG PLUG, RAN STATIC GRADIENT/TEMP SURVEY AS FOLLOWS:

DEPTH	PRESSURE	TEMP.
SURFACE	15#	75 °F
300'	145	111
500'	232	116
700'	317	123

TEMPERATURES SHOWED SMOOTH INCREASE WITH DEPTH W/ NO APPARENT HOT SPOTS

PERFORM MIT PER ATTACHED EPA SHEET

ESTABLISH INJECTION @ ¼ BPM @ 490 psi

WEATHER	SUPERVISOR	DATE
HOT, DRY	COOPER	9-22-01

Pioneer Natural Resources Canada Inc.

DAILY COMPLETION REPORT

WELL: BIERE 1-22 A, B, C, D			REPORT #: PAGE 2 of 2		
OPERATION:					
SITP:	SICP:	DWC:	CWC:	OIL	WATER
PERFORATED INTERVAL	ZONE		BEGINNING LOAD		
			FLUID USED		
			FLUID RECOVERED		
			LOAD TO RECOVER		
PBTD:	ELEV: RKB:		G.L.:	RKB-THF:	

1-22C PULLED FWG PLUG, RAN STATIC GRADIENT / TEMP SURVEY AS FOLLOWS:

DEPTH	PRESSURE	TEMP
SURFACE	252 #	80°F
300	330	110
500	416	114
700	502	117
800	546	119

TEMPERATURE SHOWED SMOOTH INCREASE WITH DEPTH & NO APPARENT HOT SPOTS

PERFORM M.I.T PER ATTACHED EPA SHEETS

ESTABLISH INJECTION - 1/4 BPM @ 240#, 1/2 @ 250, 1 @ 290-440

1-22D PULLED FWG PLUG, RAN STATIC GRADIENT / TEMP SURVEY AS FOLLOWS:

DEPTH	PRESSURE	TEMP
SURFACE	15	89
300	47	121
500	234	121
700	322	121

TEMPERATURE SHOWED A SMOOTH INCREASE WITH DEPTH & NO HOT SPOTS

PERFORM MIT PER ATTACHED EPA SHEETS

ESTABLISH INJECTION @ 1/4 BPM @ 460 psi

WEATHER	SUPERVISOR	DATE
	Cooper	9-22-01

Pioneer
Natural
Resources
Canada
Inc.

DAILY COST

CODE	ITEM	Description	Daily Cost	Cumulative Cost
102	Location Survey			
103	Site & Road const/restor			
105	Mob/Demob			
144	Fuel & lubricants			
107	Drilling Daywork			
108	Drilling Meterage			
109	Service Rig			
110	Boiler			
111	Camp & Catering			
113	Bits			
114	Mud,Chem,Comp. Fluids			
115,117,119,145	Casing			
200	Tubing			
120	Float equipment			
122	Contract serv. & hauling		8 000	
123	Cementing		15,453	
124	Directional			
146	DST & analysis			
128	Coring & analysis			
129	Logging & perforating		3514	
130	Testing & Analysis			
132	Stimulation			
133	Waste handling & Disposal		20,000	
147	Water			
135	Rentals			
136	Safety & Environment			
137	Geol. Supervision			
138	Site Supervision		1000	
139	Inspection			
202	Rods			
203	Pump			
204	Retrievable downhole eq.			
205	Perm. Downhole Eq.			
206	Wellhead			
208-218	Surf. Facilities			
229	Overhead		2348	
865	Miscellaneous		2348	
				TOTAL PROJECT
				TO DATE
		TOTAL	52,663	1,146,905

WELL NAME	SUPERVISOR	DATE
BIERS 1-22 A, B, C, D	COOPER	9-22-01

Monitoring Plan for the Shallow Groundwater

Biere Well Response Action Project
Pioneer Natural Resources USA, Inc.

June 2001

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Compliance & Environmental

INTRODUCTION

History and Background

The Biere well, Figure 1, was drilled in 1972 by Mesa Petroleum. Through subsequent business successions and acquisitions the Biere well is now the responsibility of Pioneer Natural Resources USA, Inc. (Pioneer). In response to indications that the Biere well was allowing thermal brines from oil producing and/or brine injection zones to communicate with and impact the shallow drinking water aquifer, Pioneer conducted a field investigation in the Biere well area, (Field Investigation Report, Biere Well Evaluation, Poplar, Montana (CH2M Hill, August 2000).

In a parallel task, Pioneer evaluated the construction history of the Biere well and prepared a proposed plan to re-seal the well (Proposed Biere # 1-22 Well Response Action Plan, Pioneer Natural Resources, December, 2000). The Response Action Plan, as approved by EPA, provides for the injection of an oil field sealant into the formation in sufficient quantities to seal the formation and the apparently leaking annular seal of the Biere well. The new injection wells will be installed approximately 10 feet from the Biere well on three sides. As presented in the Response Action Plan, the existing Biere relief well will be temporarily re-opened to monitor in-situ conditions during the placement of the primary sealant in the three temporary injection wells installed around the Biere well. Once the sealant is injected into the wells, the Biere relief well will also be injected with the sealant, as necessary, and abandoned.

This document summarizes the additional site characterization and post-Biere well remediation monitoring to be conducted by Pioneer pursuant to the Emergency Administrative Order on Consent entered into by the U.S. Environmental Protection Agency (EPA) and Pioneer in June 2001.

Hydrogeologic Setting and Water Quality

The conceptual model of the shallow groundwater system in the study area consists of a thin (5 to 20 feet typical thickness) aquifer of Quaternary sand and gravel deposits that are widely present on top of the underlying Cretaceous Bearpaw Shale. The aquifer has highly variable hydraulic properties depending on the thickness of the sand and gravel and the amount of fine-grained materials (silt and clay) included in the aquifer sediments. The aquifer is present between the Bearpaw Shale and overlying till. In the study area the groundwater gradients in the Quaternary aquifer are generally toward the Poplar River to the west-southwest. The shallow aquifer in the study area merges laterally with, and discharges into, the alluvial aquifer present along the current Poplar River drainage which flows generally north to south approximately 2 miles west of the Biere well area.

Sources of recharge to the shallow aquifer beneath the study area are only generally identified. There are five potential sources of recharge:

1. Direct infiltration of precipitation;
2. Lateral inflow of infiltration from highlands to the east;
3. Diffuse and/or localized vertical leakage from underlying saline aquifer(s) through structural weaknesses or zones of higher vertical permeability in the Bearpaw Shale;
4. Point source leakage from deep saline aquifer(s) via well bores; and
5. Direct infiltration of fugitive saline fluids stemming from the production of oil and the subsequent storage, transporting, pumping and disposing of this wastewater.

There is insufficient information available to proportion the recharge between the various sources of water. Some or all of these recharge sources may be active locally across the study area.

The pre-Biere well water quality of the shallow aquifer in the study area is unknown. Using the lowest specific conductivity value reported in the various reports prepared on the area by the U.S. Geological Survey (USGS), and in the Field Investigation (CH2M Hill 2000) conducted by Pioneer, and assuming there were no localized natural sources of saline water leakage, the pre-oil field water quality background probably ranged from 1,500 to 2,500 microsiemens per centimeter (uS/cm), which equates to an approximate total dissolved solids (TDS) concentration of 1,100 to 1,500 milligram per liter (mg/l). The dominant ions in the background water are calcium, magnesium and bicarbonate.

Brines in the bedrock saline aquifers and oil production zones beneath the study area have TDS concentrations of 80,000 to 120,000 mg/l and are predominantly sodium chloride. Leakage of these brines via natural pathways, leaking wells and boreholes or from fugitive water released during current and historic handling of the brines has produced localized areas within the shallow aquifer where the water chemistry has been changed from predominantly calcium-magnesium bicarbonate to predominantly sodium chloride. In addition, organic compounds typically associated with the production of petroleum; benzene, ethyl benzene, toluene and xylene (BTEX) have been detected in the shallow groundwater in the study area.

In the immediate vicinity of the Biere well, groundwater in the shallow aquifer is now a predominantly sodium chloride water with a TDS of about 65,000 mg/l. This fact, and the observations of elevated temperature and water level (head) near the Biere well, indicates that the Biere well is an active source of brine leakage into the shallow aquifer.

Elevated heads in the shallow aquifer near the Biere well appear to be a localized impact and the thermal signature quickly dissipates with distance away from the Biere well. The sodium chloride dominated shallow water chemistry signature reveals a relatively constrained chloride plume extending to the west from the Biere well. The westward flow component is also supported by the detection of benzene in monitoring well PNR-7 about 2000 feet west-northwest of the Biere well.

It is difficult to track the extension of the chloride plume from the Biere well more than about one-half mile to the west with any certainty. Benzene is not present above detectable limits in more distant wells and sodium chloride concentrations tend to blend in with the general water chemistry of the aquifer. In addition, there are numerous active and historical oil wells, brine injection and brine handling facilities, in and adjoining the study area, any of which may have in the past or be actively contributing sodium chloride and BTEX compounds to the shallow aquifer chemistry. More specifically, data collected by Pioneer Natural Resources during the field investigation suggests the possibility of one or more additional active sources of brine and BTEX compounds south-southeast of the Biere well. In addition, data collected by the USGS and EPA indicates separate area(s) contributing high TDS water and chlorides adjacent to, and probably intermingling with the northwest extension of the chloride plume from the Biere well.

The difficulty in tracking diffuse plume signatures and in assigning or proportioning recharge sources by chemistry impacts is simply that there appears to be no significant characteristic to differentiate between the numerous and various sources of brine. All brine sources impacting the shallow aquifer, whether from specific wells owned by any of the various oil companies, from years of brine handling across the study area by the many well owners, operators and service companies, or from natural leakage, are all predominantly sodium chloride. Active or recent sources of brine may also carry a BTEX component.

It is within this convoluted mixture of real and potential sources of the same contaminants that the proposed monitoring program must operate to provide meaningful evaluation of the effectiveness of the proposed remedial measures to be implemented on the Biere well.

MONITORING PLAN

Objectives and Approach

The proposed monitoring plan has three primary objectives:

1. Provide additional characterization of the shallow Quaternary aquifer near the Biere well through installation of additional shallow monitoring wells;
2. Evaluation and confirmation that the leakage from the Biere well has been curtailed by the proposed Response Action Plan;
3. Confirmation, by observation of water chemistry changes, of the area impacted by leakage from Biere well.

New Monitoring Wells

Pioneer will install 10 additional monitoring wells in the vicinity of the Biere well at the approximate locations shown on Figure 1. Final well locations are subject to site-specific access and landowner restrictions but Pioneer will strive to locate the wells as close to the proposed locations as possible.

The wells will be installed by hollow stem auger method and completed as 2-inch PVC monitoring wells similar to the previously installed wells (except PNR 4 and PNR 5 which were constructed by mud rotary techniques and are constructed of 2-inch stainless steel). The wells will be constructed to monitor the Quaternary gravel deposits on top of the underlying Bearpaw Shale. Screen length will vary with the thickness of the gravel but typically 10 feet of screen will be installed. Following installation and development, the wells will be surveyed for horizontal and vertical control.

As the boreholes of the three wells at the corners of the Biere well remediation area (Figure 1), are being advanced, water quality parameters (temperature and conductivity) will be collected at the top of the gravel and every 5 feet until the Bearpaw Shale is encountered. Following installation of these wells, Pioneer and EPA will review the field data and determine if there is an adequate gravel thickness and sufficient water quality differences to justify installation of additional shallow wells at these locations to form well nests. If justified by field observations, nested wells, consisting of two to three, independent wells with short well screens may provide additional definition of brine stratification within the Quaternary gravels.

Proposed Monitoring Well Network

There are a total of 24 wells proposed to be included in this monitoring program as listed below. The proposed monitoring program includes all of the monitoring wells installed by Pioneer:

PNR-4	PNR-5	PNR-6	PNR-7
PNR-8	PNR-9	PNR-10	PNR-11*
PNR-12	PNR-13*	PNR-14*	PNR-15*
PNR-16*	PNR-17*	PNR-18*	PNR-19*
PNR-20*	PNR-21*		

The wells with asterisks denote new wells to be installed as part of this plan.

Assuming long-term access agreements can be obtained from the controlling agencies and private well owners, the following additional wells will be included:

USGS FPB 93-3	USGS FPB 92-12
M-27 (Reddoor)	M-28 (Lockman)
M-31 (Trottier)	Buckles-Whitmer

Existing well M-30 is a private well that is not in the Quaternary aquifer affected by the Biere well and therefore Pioneer is not including M-30 in the monitoring program.

Well PNR-4 is located within the immediate working vicinity of the Biere well and the proposed response actions and as such is at risk from the myriad of equipment and drilling activities that will be employed on this project. Pioneer will take reasonable precautions to protect PNR-4 through the use of concrete barriers, flagging and contractor awareness but complete safety is not assured. It is also possible that the drilling equipment used in the response action will unavoidably have to be set up such that PNR-4 must be disturbed or destroyed. If, in Pioneer's opinion, PNR-4 cannot be protected or must be abandoned, the well will either be temporarily abandoned or plugged and abandoned. Temporary abandonment will be accomplished by filling the screen section with sand and the remainder of the casing with bentonite and the wellhead cut off and sealed at ground level. If the well must be plugged and abandoned, it will be filled with cement grout and cut off 2 feet below ground level.

A shallow well into the Quaternary gravel in the immediate vicinity of the Biere well is critical to the post remedial monitoring to determine the effectiveness of the response actions taken on the Biere well. Consequently, if PNR-4 must be plugged and abandoned, Pioneer will install a replacement well in this area as soon as the drilling equipment used to install the injection wells is removed.

Monitoring Schedule and Duration

The new wells will be installed in the summer 2001 field season. After all new wells are installed and access agreements reached for existing private wells, a complete round of samples will be collected. This sampling event should occur in late summer/early fall 2001. Pending availability of drilling contractors, the Biere well remediation is anticipated to occur in the late fall 2001. A second round of samples will be collected from all monitoring wells just prior to the remedial activities at the Biere well. Immediately after the Biere well remedial measures have been completed, all monitoring wells will again be sampled. Sampling will be repeated quarterly for 2 years (8 quarterly samples) after the Biere well remediation has been completed.

Quarterly sampling will typically be conducted in March, June, September and December. The schedule for winter and spring sampling events will be flexible to avoid inclement weather. To the extent possible the samples will be collected during the same annual time frame to allow seasonal comparison of water chemistry trends.

The results of each sampling event will be submitted to the appropriate regulatory agencies for general information. At the end of the initial 2-year period, the results of the 8 quarterly samples will be combined with the existing available water chemistry data and presented in a written report to the regulatory agencies. This report will provide analysis of the results relative to the objectives of the monitoring program and will provide the basis for discussions with the agencies regarding any modifications to the monitoring program. A logical long term monitoring program consists of more frequent sampling of wells near the Biere well and less frequent sampling at wells distant from the Biere well. Consequently, at the end of the initial 2-year monitoring period, a semi-annual sampling schedule or a combination of quarterly and semi-annual sampling schedules may be adopted.

After 5 years of post-Biere well remediation monitoring, the data will again be compiled into a comprehensive report and discussions with the regulating agencies will be held to establish a long term monitoring program consistent with, and in conjunction with other basin wide remedies and actions stemming from the EPA's basin wide order to address water quality issues stemming from oil production activities in the East Poplar Oil Field.

Analyses

The proposed monitoring parameters consist of:

Temperature*	Specific Conductivity*
pH*	Total Dissolved Solids
Sodium	Chloride
TPH	BTEX
Total Silica	

Asterisks indicate field parameters. Temperature, specific conductivity and pH will be measured in the field as the well is being purged prior to sampling. Specific conductivity and pH will also be determined in the laboratory. Total silica is included initially for all wells because the proposed sealant for the Biere well remediation is a sodium silicate based product. Once a reasonable baseline value for silica is established it will be dropped from the list of quarterly analytes except for the six wells in the immediate vicinity of the Biere well (PNR-4, PNR-5, PNR-14, PNR-15, PNR-17, USGS FPB93-3)

Initially, and on an annual basis thereafter, all wells will be sampled for additional ions to allow water typing, to evaluate changes in other chemistry parameters and for use in establishing water chemistry relationships between wells. The supplementary parameters are:

Calcium	Magnesium
Potassium	Total Hardness
Alkalinity	Bicarbonate

Carbonate	Nitrogen (Nitrate plus Nitrite)
Total Silica	

Sampling Procedures

Water Level Measurements

Within one 24-hour period at the start of each sampling event, water levels will be measured in all wells for which access can be obtained and that are not being actively pumped. Buckles-Whitmer, and possibly M-27, are active wells for which a water level measurement may not be feasible to collect.

Sequence and Methodology

All wells will be sampled in a generally "clean" to "dirty" sequence, based on previous sample data, beginning with the wells most distant from the Biere well and culminating with PNR 4. Sampling will be conducted using industry standards for general environmental investigations and will be sampled using a variety of equipment depending on the physical condition of the well, depth to water, and the existence or availability of existing equipment.

The monitoring wells and wells M-28 and M-31 will be sampled using a portable submersible sampling pump that is flushed and decontaminated between samples. Water level in well PNR 8 is too deep and the well does not make enough water to sample with a pump and therefore a Teflon bailer will be used to sample this well. The Buckles-Whitmer and M-27 domestic wells will be sampled directly from the existing pump discharge from a faucet or tap that is not affected by any water softeners or filters.

Well PNR-4 has an accumulation of oil on the water surface and repeated monitoring of this well under these conditions is problematic. The initial monitoring approach for PNR-4 will be as follows:

The depth to the top of the oil will be measured;

The oil will be pumped or bailed off and contained;

A dedicated, but not permanently installed, sampling pump will be used to purge and sample formation water;

Water levels prior to sampling and following sampling will be monitored to establish a representative direct measurement of formation head without significant interference from accumulated oil or the need to make liquid phase density corrections;

The containerized oil and water will be collected and disposed of by a licensed waste oil hauler.

Depending on the logistical difficulties associated with containment and disposal of the oil and pre-sample purge water, Pioneer may explore various alternative monitoring approaches for this well including, but not limited to, retrofitting the well with a smaller diameter liner open only at the bottom or the use of in-situ probe(s) to measure temperature, head and conductivity. If a suitable pressure transducer, thermistor and conductivity probe is used only periodic confirmation samples and direct measurements will be collected following the procedures outlined above. As of the date of this monitoring plan, dedicated equipment capable of handling the elevated temperature and high conductivity anticipated for this well has not been located and therefore the sampling procedures provided above will be followed.

EPA has expressed concern that the accumulation of oil in PNR-4 may make effective monitoring of this well impossible. As stated previously, a monitoring well at this location is vital to the post response action-monitoring program. If, Pioneer is unable to overcome the effects of the accumulated oil through sampling techniques, installation of a liner, or dedicated probe(s), a replacement well will be installed. If a replacement well is required, the current PNR-4 will be plugged and abandoned as described previously. A replacement well will not be installed until after the injection wells are installed to avoid potential damage to the new well. Pioneer will present EPA with drilling prospectus and proposed well construction plan prior to installation of new well at this location.

<u>Purge Water Handling</u>

Water removed prior to sampling (purge water) will be handled according to the salinity of the water as determined by field conductivity measurements or if BTEX constituents have been previously detected. Water with a conductivity of 5,000 umhos/cm^2 (5.0 millisiemens/cm) or less will be discharged directly on the ground near the wellhead in such a manner as to prevent the water from accumulating near the well. Water with a conductivity greater that 5,000 umhos/cm will be containerized at the wellhead. Containerized purge water will be transported from each well to a central, temporary, storage container to be established on the Biere well work pad. Water with oil and or from wells with known BTEX constituents will be contained separately from water with only high salinity. The specific conductivity of the containerized water will be measured and a sample collected for BTEX and TPH at the end of each sampling event. The results of this sample will be used to determine appropriate disposal of the contained liquid. The final containment and disposal method for the sample purge water has not been identified at this time but will have to be finalized and agreed to prior to sampling. The disposal options that are being considered are discussed in the following paragraphs.

If BTEX constituent concentrations are below their respective Maximum Contaminant Limit (MCL), and arrangements can be reached with either the cities of Poplar or Wolf Point, a contract will be established with a local vacuum truck service to retrieve the water and dispose of it in the sewage treatment system.

If oil is present or if BTEX concentrations are above MCL's, a licensed waste oil hauler will be contracted to retrieve and dispose of the liquids offsite at an approved facility.

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Quality Assurance/Quality Control

Chain of Custody and Analytical Methods

All samples will be submitted following standard Chain of Custody (COC) protocols to a state approved, independent laboratory for analysis using the current EPA methods prescribed in SW-846. Laboratory detection and reporting limits will meet or exceed (be less than) the State of Montana or EPA groundwater protection standards for the specific compound or constituent. Laboratory QA/QC procedures for organic analyses, including Reagent Blanks and Surrogate Recovery Reports will be provided by the laboratory with each analytical report.

Field, Equipment and Travel Blanks

One set of field blanks, equipment blanks, and travel blanks will be collected during each sampling event to evaluate whether the organic sample results are being adversely impacted by secondary contaminant sources including cross contamination from equipment, bottle contamination or contaminants introduced during shipping. Because of the higher reporting limits, no QA/QC blanks will be collected for the non-organic constituents and parameters being analyzed for.

Because of the sensitivity of the analysis, BTEX samples will be stored and shipped separately from the other sample containers. Samples with known or suspected BTEX constituents will be stored and shipped separately from other BTEX samples. A travel blank will accompany each BTEX shipping container.

One field blank will be collected during each sampling event. The field blank will be prepared by pouring laboratory grade de-ionized water into a 40 ml vial to simulate ambient conditions at the well head when the actual BTEX sample was collected.

One equipment blank sample will be collected during each sampling event. As with the field blank, the specific well where the sample is collected will vary from event to event at the discretion of the sampling team. The procedure for the equipment blank will vary depending the sampling equipment being used. For bailed wells, if a re-useable bailer is being used, between uses the bailer will be washed and rinsed using soap, de-ionized water, a methanol rinse then followed by a second rinse of de-ionized water. Prior to collecting a sample with the bailer from a well designated to have an equipment blank collected, the bailer will be filled with laboratory grade, de-ionized water, then a 40 ml vial sample bottle will be filled from the bailer and submitted for BTEX analysis.

Equipment blank sample preparation for wells sampled by portable, non-dedicated, sample pumps will vary somewhat depending the type of pump used. To the extent possible, dedicated tubing will be used for each well to avoid cross contamination issues. The general procedure for pump decontamination and collection of equipment blanks is as follows. The pump will be washed and rinsed between uses and between wells by pumping approximately 1 gallon of a soap solution followed by 2 to 3 gallons of rinse water through the pump. If non-dedicated pump discharge hose is used the decontamination solution will be pumped through the tubing. The wash and rinse water will be directed over the pump electrical cable to simultaneously decontaminate the wire. An equipment blank will be prepared by inserting the pump into a source of laboratory grade de-ionized water and collecting a sample in a 40 ml vial following the same procedures as would be followed in collecting a normal sample. The equipment blank sample will be submitted for BTEX analysis.

Duplicate Samples

Periodically, at the discretion of the project team, blind duplicate samples may be collected and submitted for analysis. In general duplicate samples will be used to verify BTEX results in pertinent wells. Blind duplicates will be collected by sequentially filling two sets of 40 ml vials from the sample pump discharge stream. One set will be fully labeled, including well number, date and time; the duplicate set of vials will be labeled with a simple identifier but will not include date or time. Duplicate samples will be submitted under COC protocols with the normal samples. The specific well(s) from which duplicate samples will be collected, in any, have not been established.

Split Samples

Split samples (duplicate samples sent to two different laboratories) are not anticipated at this time. However, Pioneer may submit split samples for several reasons, including questions or concerns about the accuracy of the laboratory or to provide data for comparison of laboratories. It is also anticipated that interested parties or regulatory agencies may request split samples for submission to their own independent laboratories. Pioneer will attempt to accommodate requests for split samples by providing access to the sample discharge streams during a scheduled sampling event so the requesting party can collect their own samples.

Anticipated Monitoring Response to Biere Well Remediation

The monitoring program described above contains elements to continue the characterization efforts necessary to establish the area of impact and groundwater flow paths transporting oil field brines from the Biere well and surrounding study area, and to provide field and analytical data useful for evaluating and monitoring the effectiveness of the proposed remedial measures at the Biere well.

The underlying and long-term metric for evaluating the effectiveness of the Biere well remediation is that the water chemistry in the Quaternary groundwater system is restored to background levels. However, over the many years of oil field activities in and around the Biere well, a large mass of ions and organic constituents have been released and are present in the soils and groundwater within the impact area. In addition groundwater flux (volumetric flow rate) through the system does not appear to be very high and consequently it will likely take many years for the groundwater system to reach background levels once the Biere well is sealed.

Although the ultimate evaluation is long-term recovery, it is essential that short-term responses in nearby monitoring wells be used to monitor the effectiveness of the remedial measures at the Biere well. Using organic compounds for monitoring criteria to evaluate remediation success near the Biere well is problematic due to the mass of hydrocarbons present and the highly variable factors that control their concentrations in groundwater. Therefore, the most effective way to gauge success is by monitoring TDS through specific conductivity and specific ions, temperature and head (water levels) in the nearby wells. Using these parameters as indicators, the post remediation monitoring data is anticipated to fall into one of these general categories depending on the following scenarios:

> No change, or worse, an increase in these parameters - the remedial measure failed.
>
> Rapid decrease in nearby wells followed by progressive change in more distant wells over time - complete or significant partial success.
>
> Rapid decrease in nearby wells but quickly stabilizing at levels well above background - partial success.
>
> A downward trend in any of the major indices followed by a significant and distinct reversal - a temporary success, i.e. break through.

In the wells nearest the Biere well, a logical progression of the basic monitoring parameters, in order of expected response, indicative of successfully sealing the Biere well is as follows:

> A very rapid reduction in pressure or "head" in the aquifer near the Biere well.
>
> Noticeable temperature decrease in the Quaternary aquifer over several monitoring cycles.
>
> A distinct decrease in TDS (as represented by decreases in conductivity, chloride, etc.) trending toward background but possibly requiring several seasons of advective groundwater flow to be fully apparent. Wells on the up gradient side of the Biere well and those in high flow parts of the aquifer should improve first. It will probably take multiple years to reach background depending on advective flow rates and groundwater flux through the system.

For the purposes of monitoring immediate success of the remediation - those wells near the Biere well will provide the most useful data. Assuming success in sealing the Biere well, with time, sampling data from the distant wells should also provide confirmation that the Biere well was successfully sealed.

Long-term recovery of the impacted groundwater as demonstrated by improving water quality trends in distant wells, may require significant time to develop. However, with increasing distance, and time, from the Biere well, there is also more opportunity for regional impacts and other unknown sources to affect the water chemistry. The summary report and review meetings proposed after two years, and five years of monitoring following the Biere well response action will provide valuable check points to evaluate the effectiveness of the response action and to identify appropriate changes to the monitoring program based on the data collected.

REC

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TRANSMITTAL LETTER

Project Name & Locations: Pioneer Natural Resources USA, Inc., Biere 1-22 Production Well, Poplar Oil Field, MT

Name: Nathan Wiser
Office of Enforcement, Compliance
And Environmental Justice
Technical Enforcement Program (8-ENF-T)
US EPA
999 18th Street, Suite 500
Denver, CO 80202-2466

Date: June 11, 2001
Project No.: H:\14\R144102\RRW02446.doc

WE TRANSMIT:

☒ herewith ☐ under separate cover via
☐ in accordance with your request

FOR YOUR:

☐ approval ☐ distribution to parties ☐ information
☐ record ☐ review & comment ☒ use
☐ other

THE FOLLOWING:

☐ drawings ☐ shop drawing prints ☐ samples
☐ specs ☐ shop drawing reproducible ☐ product literature
☐ change order ☐ progress estimates ☒ other Well Location Map

Copies	Date	Description	Action Code
1	6/11/01	Well Location Map	

Action Code:
A - No Exception Noted B - Corrections Required C - Revise & Resubmit
D - For signature & return to this office

REMARKS

RECEIVED
JUN 12 2001

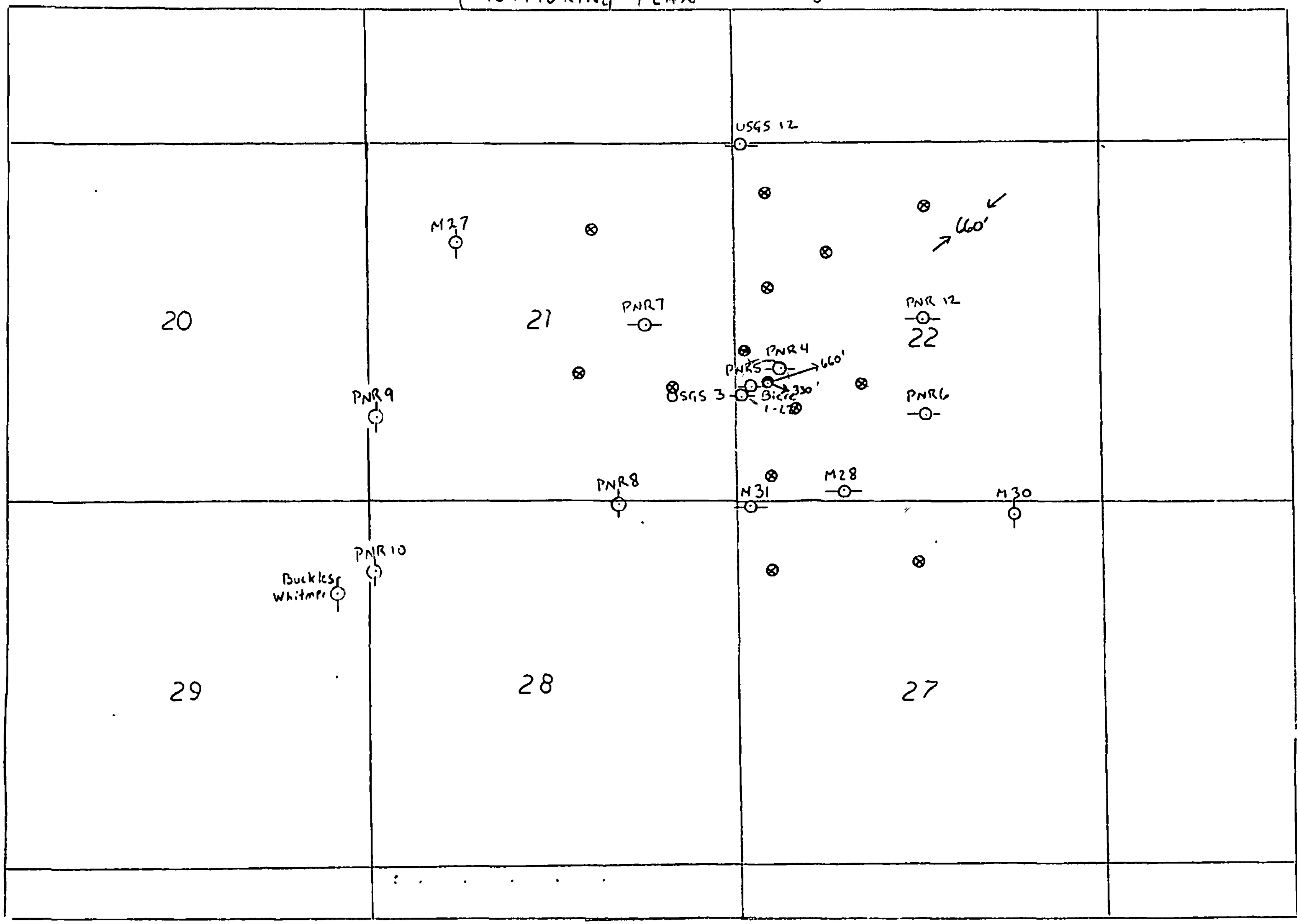
COPIES TO: Steve Leifer, Baker Botts
John Ross, Brown Law Firm
Marc Skeen, Pioneer Natural Resources
Wilbur Dover, Pioneer Natural Resources
Chuck Feast, Hiddleston Drilling

BY: Charles L. Peterson

PIONEER NATURAL RESOURCES
BIERE 1-22 REMEDIATION
MONITORING PLAN

dated Jan. 30, 2001

No.



Sample Parameters

Temperature
pH
Specific Conduct.
TDS
Na
Cl
TPH
BTEX

← 1 mile →

⊗ Suggested Additional Monitoring Well Location

(1) ● = Leaking 5800' Production Well
(9) -⊙- = Monitoring (0-100') Well 3-mo. Sample
(6) ⊙ = Monitoring (0-100') Well 6-mo. Sample

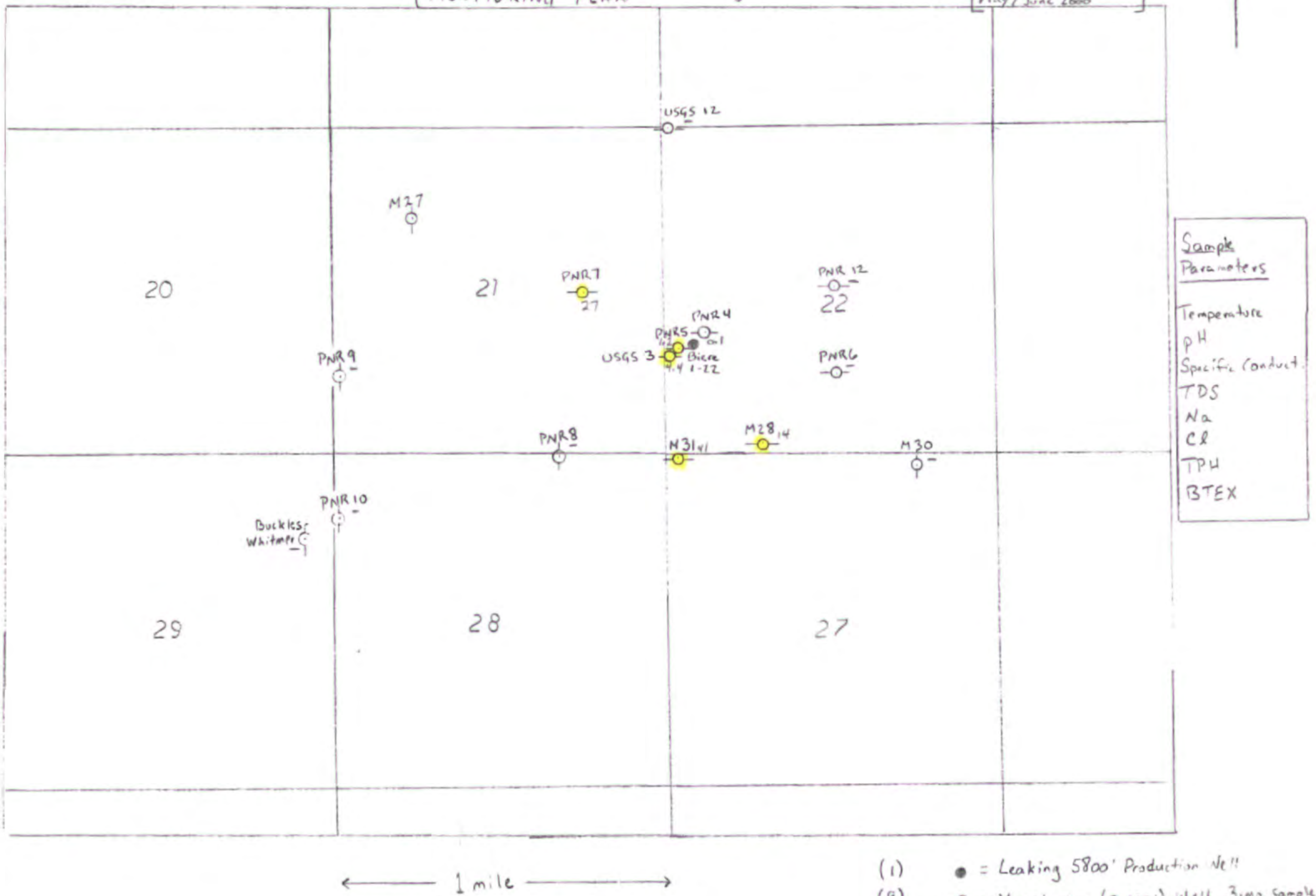
By: N. Wiser 3-1-2001

PIONEER NATURAL RESOURCES
BIERE 1-22 REMEDIATION
MONITORING PLAN

dated Jan. 30, 2001

Benzene in µg/l
May/June 2000

No.



(1) ● = Leaking 5800' Production Well
(9) –O– = Monitoring (0-100') Well 3-mo. Sample
(6) ⌽ = Monitoring (0-100') Well 6-mo. Sample

By N. Wiser 3-1-2001

Pioneer Natural Resources
Biere 1-22 Remediation
Monitoring Plan

dated Jan 30, 2001

Total Xylenes in µg/l
May/June 2000

No.

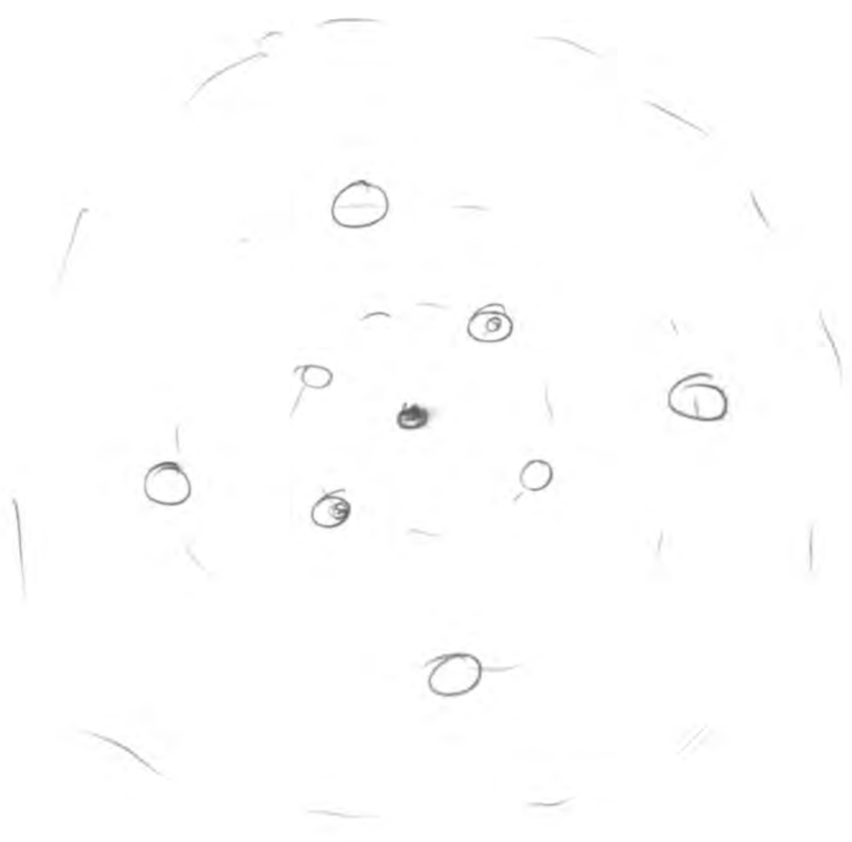
← 1 mile →

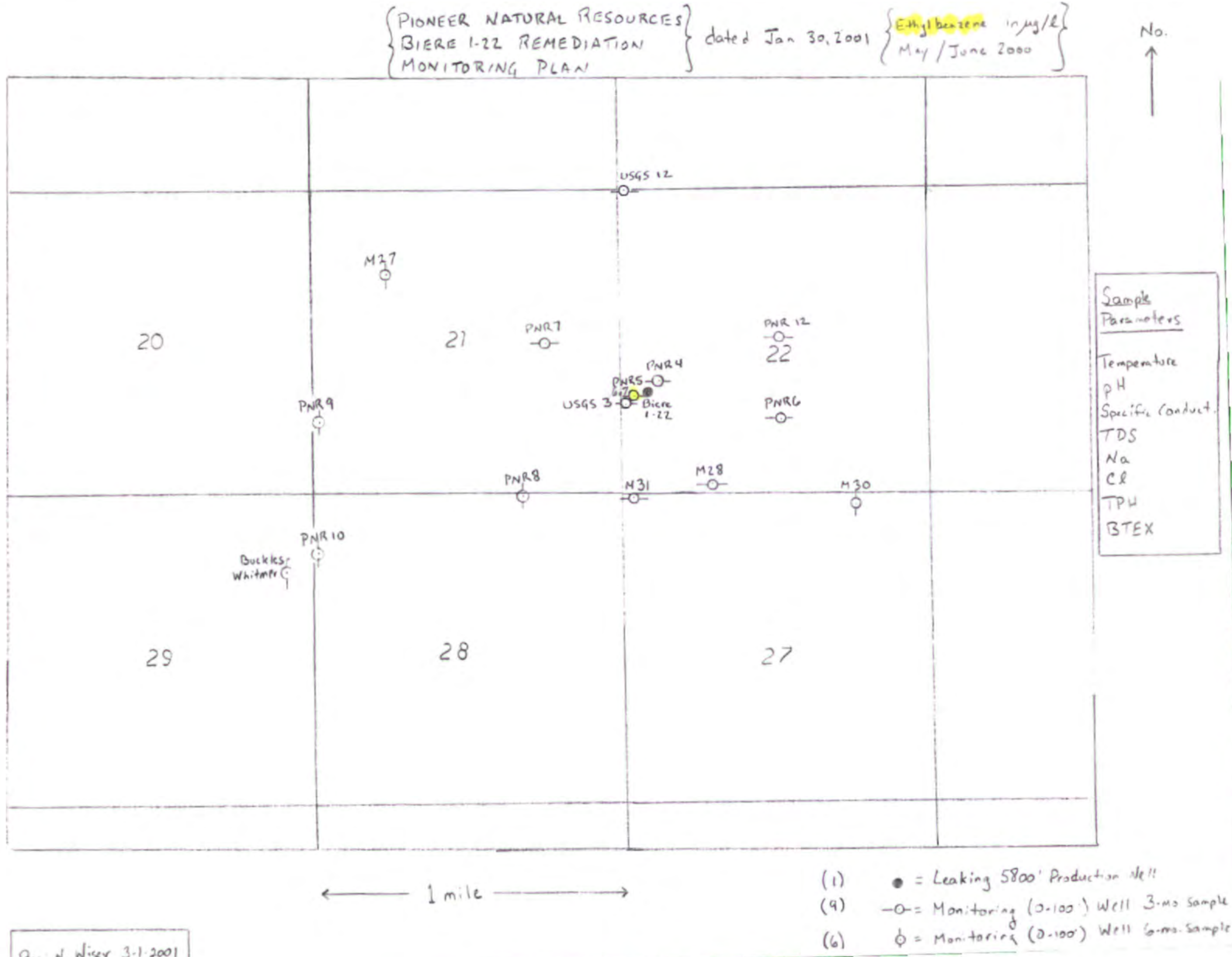
(1) ● = Leaking 5800' Production Well

(9) –O– = Monitoring (0-100') Well 3-mo. Sample

(6) ⦶ = Monitoring (0-100') Well 6-mo. Sample

By N. Wiser 3-1-2001





By N. Wiser 3-1-2001

PIONEER NATURAL RESOURCES
BIERE 1-22 REMEDIATION
MONITORING PLAN

dated Jan 30, 2001

Toluene in μg/ℓ
May/June 2000

No.

Sample Parameters

Temperature
pH
Specific Conduct.
TDS
Na
Cl
TPH
BTEX

(1) ● = Leaking 5800' Production Well
(9) -○- = Monitoring (0-100') Well 3-mo Sample
(6) ⦶ = Monitoring (0-100') Well 6-mo Sample

By: N. Wiser 3-1-2001